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A

PRACTICE OF MEDICINE.

BY

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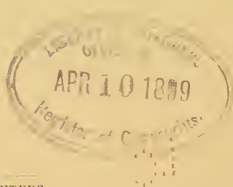
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To the Memory
of
Dr. George William Barnes,
A Pioneer of the Profession in Southern California,
and
A Lover of Mankind,
This Volume is Affectionately Dedicated.

PREFACE.

The purpose, originally entertained, of putting within one volume of, not to exceed, one thousand pages the information which the general practitioner and the student of medicine expect to find in a work on "Practice" had to be abandoned as the work itself took shape. It is hoped that the reader will find no waste of space, and will come to the conclusion that the volume could not be materially reduced in size without also lessening its usefulness.

The completion of the work has been delayed by impaired health and by the difficulties of reading proof set up at a distance of three thousand miles. In spite of every precaution a few annoying typographical errors have crept into the text. Of these, the most serious will be found on page 572. "Affections of the Blood-vessels of the Skin" should, of course, read "of the Spine." The reader is requested to make the necessary correction.

Acknowledgment for aid rendered in the preparation of the manuscript for the printer and in reading proof is due to my assistant, Dr. R. de L. Foster.

H. R. ARNDT.

San Diego, California, January, 1899.

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PART I.

SPECIFIC INFECTIOUS DISEASES.

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TYPHOID FEVER.

(*Enteric Fever; Typhus Abdominalis; Ileo-typhus.*)

Description and Causation.—Typhoid fever occurs chiefly in temperate climates, especially during the months of August, September and October, when the weather is hot and dry and the ground-water low. Young people are more frequently the victims. About one-half of the cases occur from fifteen to twenty-five years of age. After the age of thirty the liability to this fever grows rapidly less, and at fifty it practically ceases. However, the quite young and the aged may be attacked by it. If found in the extremes of life, the disease, though terminating fatally, may escape recognition, being covered up by the symptoms of such complications as are usual at this time of life. Congenital cases are known to have occurred, the mother having had the fever late during her pregnancy. One attack generally, though by no means always, insures immunity from subsequent seizures.

The specific cause of typhoid fever is the typhoid-bacillus (Koch-Eberth), "a short, thick rod with rounded ends, three times as long as broad, rendered easily visible by saturated solutions of methylene blue. Vacuoles in the ends of the vessels are taken for spores" (Whittaker). A chemical agent, typhotoxine, has been extracted, which, injected, becomes a source of specific infection, causing typhoid fever. The bacillus is destroyed by heat, lives in drinking water from seven to fourteen days, and in sewage, dung-hills, etc., for a period not exceeding three months. In the infected human body it is found in colonies in the intestinal lymphoid tissue, mesenteric glands, spleen, liver, stool, blood, urine, meninges and, it is claimed, even in the blood of the foetus.

The disease, almost always, is conveyed by the use of contaminated drinking water from wells, springs or reservoirs, into which have emptied or filtered dejecta containing the specific bacillus. This has been demonstrated beyond the possibility of doubt. Milk, diluted with water containing the typhoid bacillus or carried in cans rinsed with similarly impure water, has thus become an effective carrier of the disease. Pettenkoffer maintains that the ground-soil is the breeder of the bacillus; that the soil made up of alluvial and detrital deposits, *i. e.*, soil easily penetrated by air and water, is favorable to the development of the specific poison and to the spread of the disease, while heavy, firm, rocky soil renders its development and spread impossible. Pettenkoffer and his followers insist that certain changes in the soil are necessary before infection becomes possible; that the ground air, rising, carries the infection into the atmosphere and into the houses, where it is inhaled; they have also shown that when water stands high in the ground, the disease is restricted; that when it stands low, cases occur with much greater frequency. The effect of the different kinds of ground-soil upon the development of the bacillus, it is maintained with considerable show of justice, also explains why during epidemics certain streets or parts of a town are heavily afflicted, while others almost wholly escape.

Further observation will undoubtedly prove that there is more than one mode of infection, and conveyance of the disease germs by means of the air inhaled will be shown to be common. In all cases, however, individual susceptibility plays an important rôle in the spread of this, and every other, infectious disease, some persons, constantly exposed to the infection, remaining well, while others, though equally robust, easily fall a victim under exposure to the same agent.

That an element of contagion exists in typhoid fever seems established from the fact that nurses and others—as domestics or laundrymen who handle the body linen of persons sick with typhoid fever—quite commonly succumb to the fever.

Symptomatology.—In the vast majority of cases the period of incubation is more or less protracted, extending from a few days to two, or more, weeks, and in exceptional cases even longer. The patient complains of remarkable prostration, indisposition, lassitude and inability to discharge the common

duties of life. There is present a severe, distressing headache, with bad taste in the mouth, loss of appetite, shivering, sometimes followed by slight fever, aching all over, especially in the arms and legs, and often repeated and copious bleeding at the nose. The prostration and general condition becoming worse, the patient is obliged to go to bed, and the case passes into the care of a physician. During the first week in bed the symptom which attracts most attention is the characteristic fever, the bodily temperature rising steadily from one and one-half degrees each day until at the end of the week a temperature of 103° to 104° is reached. The pathognomonic "step-ladder" ascent of the temperature curve is due to the thermometer in the evening (4 to 8 P. M.) registering one or one and one-half degrees higher than in the morning (4 to 8 A. M.) of the same day, the morning temperature of successive days showing the same gain, giving a daily, distinct remission. The pulse, in the meantime ranges from 100 to 110, is rather heavy, full, but of low tension, not uncommonly dicrotic. If the fever is exceptionally high, delirium, especially at night, may be present; if so, it is likely to be a low, muttering delirium. In the average case, however, the very stubborn and painful headache, which has continued, and which may continue for weeks to come, is accompanied with a confused state of mind and great apathy, the patient, even at this early stage of the disease, betraying a tendency to that perfect indifference to all externals, and even to his own condition, which is marked in the so-called typhoid state. The coating of the tongue has become thick and white, though a reasonable degree of moisture may still be present. Tenderness and distension of the abdomen are noted. Diarrhœic stools, two or three times daily, of grayish-brown appearance ("pea-soup" diarrhœa), frequently very offensive, occur; in rare cases constipation exists, and in exceptional cases may continue throughout the course of the disease. Later, splenic enlargement shows itself, and usually at the end of the first week, sometimes not until the tenth day, the characteristic rash appears. More commonly this rash—rose-colored, slightly raised, disappearing under pressure, but returning promptly when the pressure is removed—is first seen on the abdomen; other parts of the body may also show it, as the lower chest, back, arms, legs, etc. The urine is dark-colored and scanty.

The *second* week of the disease, if the case proves an exceptionally light one, sees a decrease in the fever, with, possibly, a return of normal temperature at its close. Such cases, however, are comparatively rare, though often the indicated remedy does excellent work, aborting attacks which threatened to be persistent and violent. Usually the fever remains continuously high, the morning remissions being very slight or disappearing entirely. The expression of the face has become heavy, stupid and listless; the tongue and lips are dry. The abdominal symptoms steadily increase in severity, diarrhœa, tympanitis and tenderness being well pronounced and in some cases increasing daily. The pulse is less full, quick, comparatively light, no longer dicrotic. The so-called "typhoid state" becomes more marked: slight notice is taken of what is transpiring in the room: the intense headache is endured without complaint; though parched with thirst, the sick one does not ask for drink, but appears utterly indifferent to everything.

Death at this time may result from the profound depression of the nervous system, from profuse hæmorrhage, or from perforation.

The *third* week may witness an improvement in the general condition of the case. If so, the fever and temperature are lowered and the morning remissions pronounced; the tone of the nervous system is better and the apathy less profound. Many of the special symptoms, as the abdominal symptoms, may remain threatening. Under the most encouraging conditions the patient suffers much from weakness; the great waste which has been going on, with the lack of nourishment, explains the exhaustion and loss of flesh which are apparent at this time even in the most favorable cases.

Should the typhoid state become more pronounced, the delirium grows more constant, possibly more violent, unsteadiness of motion and muscular tremors show themselves, pulmonary or cardiac involvement set in, and the sphincters become relaxed. There is now special danger from hæmorrhage and perforation.

The *fourth* week is likely to witness a decided change. If for the better, the general tone of the patient improves. The temperature lowers and within a few days becomes normal; with it, the delirium subsides and the mental condition improves,

sometimes quickly and to a remarkable degree; the tongue clears off, and there is a desire for food; the diarrhoea also grows better and may disappear within a few days. If the change is for the worse, all the symptoms grow in severity; the fever remains continuously high, the pulse becomes thread-like, the face expresses extreme prostration of the vital forces; the lips and tongue are dry, brown, fissured, at times ulcerated; the lips and teeth are covered with sordes; the jaw drops; delirium of a low character is constant; fæces and urine are passed involuntarily and unconsciously; the patient picks at the bed-clothes, grasps imaginary objects, and slides down in the bed; fetor from the mouth may be very offensive; the urinary secretion in most cases is very scanty, and tympanitis excessive. At this time the chief danger to life arises from secondary complications; heart failure here is common.

The *fourth* week safely passed, the average case convalesces by lysis, yet fever may continue for an indefinite period, sometimes for several weeks. There is danger of relapse or recrudescence of the fever and of complications. Recovery is always slow. Unusual care must be taken to guard the patient against over-exertion, over-eating, or exposure.

Special Symptoms.—The *onset* of typhoid fever is not always as insidious as described. Sometimes severe *pulmonary* symptoms appear first, a true lobar pneumonia developing, with typhoid symptoms following later and unexpected; or a *bronchial catarrh* may be so pronounced as to seriously embarrass the diagnosis. Or the *gastric* symptoms which so commonly accompany the prodromal stage may be sufficiently violent to throw off his guard even an experienced diagnostician. Or the medical man may not be consulted at once; this often happens when the patient is determined to overcome by his own exertion the malaise and sense of exhaustion from which he suffers. In such cases, when the vital forces finally and suddenly yield, high fever and violent, even maniacal, delirium may be the first symptoms which present themselves to the physician. Again, we may find the so-called “ambulatory” form of the disease, the case dragging along a slow, leisurely course, and the patient presuming that he is merely suffering from malarial poisoning. It is not unusual in the latter form to find on the first visit a temperature of 104° and a well-developed rash.

Much less rare among the early modifications and complications are acute nephritis, meningitis and, in very exceptional cases, hæmorrhage or perforation.

Fever—Typhoid fever is often divided into weeks: "First, a week of ascent; second, the two weeks of continuous elevation; third, the week of marked remission up to the conclusion of the disease. The weeks correspond quite closely to the anatomical lesions in the intestinal canal. During the first week the glands and follicles are in a state of hyperæmia; during the second week there is associated tumefaction; during the third week the glands slough; during the fourth week they cicatrize." (Whittaker.) The fever thus is largely governed by the local intestinal lesion and its development; characteristic temperature curve has been pointed out, as well as its remittancy, the average difference between evening and morning temperature being from three to four degrees.

Variations occur. In certain cases, marked by the sudden onset of a heavy chill, the temperature may at once rise to 103° , or more. A favorable turn in the course of the disease may produce a ready return to normal within the second week. Or, during convalescence, a trifling exertion, some slight indiscretion, may send up the temperature, and keep it high for several days, then returning to normal; no anxiety need be felt at such a time if the general state of the patient undergoes no change for the worse. If, however, during the latter part of the third week, in spite of a normal morning and day temperature, a persistent and continuous rise is observed in the evening, the possibility is that complications exist—as marked anæmia—which should be carefully watched.

A very high temperature is suspicious: hyperpyrexia with a register of 106° is a dangerous sign, usually denoting approaching death. A sudden drop in the temperature to sub-normal indicates internal hæmorrhage, even before the blood appears in the stool, and is a grave symptom.

Generally speaking, it must be remembered that very nervous people in whom the constitutional symptoms may give no cause for anxiety, may still have a comparatively high temperature. Exceptional cases have been put on record in which all the pathognomonic constitutional symptoms were present, while no fever existed (afebrile type). The *pulse* during convalescence is often remarkably slow.

Gastro-Intestinal Symptoms.—The appearance of the tongue has been described; the throat (fauces) is sometimes much congested, and catarrhal pharyngitis of moderate severity may exist. Should extensive membranous deposits occur in the pharynx during the latter part of the disease, an unfavorable termination of the case is probable. The gastric symptoms vary in intensity. Vomiting, in exceptional cases, may itself become a dangerous complication, death through exhaustion having resulted from it. During the third, and even second, week gastric ulceration may develop.

Diarrhœa is common; it is usually catarrhal and persists for the first two weeks; sometimes it appears later in the course of the disease. Blood is often seen in the stool by the aid of the microscope, but the term "bloody stool" is not used save when the naked eye detects it. The stools are offensive, alkaline and, upon standing, separate into a thin serous layer and a sediment which contains remnants of food, débris, triple phosphate crystals, possibly blood and, later, sloughs of glandular structure and intestinal tissue. Hæmorrhage is not uncommon; it occurs in three to five per cent of all cases; while always a serious symptom, it does not of itself determine a fatal issue. If the bleeding is from intense hyperæmia, which may find also relief in vomiting black blood (melæna), it is neither so active nor so copious as when the result of the separation of a slough, a common occurrence during the third week. If the latter, no warning whatever may have been given, and the hæmorrhage itself is accompanied by symptoms of collapse. *Abdominal distension* (meteorism), if excessive, may be taken as an indication that the local lesion is severe; by pressure on the diaphragm it may interfere with breathing and with the action of the heart, and may even favor perforation. *Gurgling noises* in the abdomen, marked in the right iliac fossa, are very common; they are caused by the presence of gas and liquid stool in the colon and caecum; tenderness on pressure is present. *Peritonitis* results from extension of necrosis, from rupture of the softened gland, or from *perforation* of an ulcer. The latter is the most serious accident which can arise in the course of the disease. It more frequently occurs in the ileum or colon, and it is said that men are more liable to it than women. This accident occurs from the fourteenth to the twenty-first day,

and is characterized by intense abdominal pain, copious hæmorrhage, sudden distension, excessive tenderness and rigidity of the abdomen, with pinched face, thread-like pulse, vomiting, and other symptoms of collapse.

The Rash.—There are cases in which the eruption of typhoid fever is absent (children) or where, instead of presenting the appearance described, it is dark or petechial. In some cases it is erythematous, resembling the rash of scarlet fever. Again, an irregularly outlined, subcuticular, pale blue eruption may appear on the abdomen, chest, thigh (*peliomata*); this, French authorities affirm, occurs where the patient suffers from body lice. If there is copious sweating, sudamina and miliary eruptions are found. The more common, pathognomonic eruption is felt as an elevation on the skin and disappears in two or three days, leaving a brownish stain; successive crops appear during the first two weeks. Eventually, desquamation takes place in bran-like scales or in large flakes.

The *glands* of the body are frequently involved. Parotitis unilateral, often suppurative, is common. The *spleen* is always enlarged, and can easily be found unless the colon is very greatly distended; its size decreases about the twenty-fourth day. Infarctions, abscesses and rupture, the latter spontaneous or from slight violence, may take place. The *liver* at times is enlarged; there may be jaundice, catarrhal or parenchymatous; rarely hepatic abscess forms. The *organs of respiration* may be seriously affected, as by the occurrence of bronchitis and lobar pneumonia. Pleuritis, hypostatic congestion, œdema and hæmoptysis may also take place. Characteristic and important renal complications are not often found. Nephritis and pyelitis are occasional complications, and even orchitis may appear as a sequel. Muscular changes, *i. e.* fatty degeneration, occur in all continued fevers; and, as an expression of the general cachexia, arthritic inflammations, with possible necrosis (*tibia*), may be noted.

The Nervous Symptoms have been described. The profound prostration is among the most striking phenomena of typhoid fever. The tendency to *coma vigil* is noteworthy, with the implied absence of *violent* delirium or mania at any time in the course of the disease. In some cases the nervous system first and specifically expresses the action of the poison, and then

well-pronounced symptoms of meningitis, even to convulsions, may mark the first stage of the disease. The *headache* is peculiarly agonizing, and may continue until convalescence is well established.

It seems to me that the nervous symptoms are the most reliable indication we possess of the progress of a case, and in the absence of fatal hæmorrhage, perforation or other startling complications, we may treat with considerable indifference any untoward symptoms that may arise so long as we are capable of relieving to an appreciable extent the pressure upon the nervous system.

As *sequels*, we occasionally find aphasia (in children), neuritis and paralytic affections, the latter usually due to poliomyelitis. Confusional insanity, the result of prostration of the nerve centers and of impaired nutrition, is sometimes observed.

Varieties and Relapse.—Attempts to classify types of typhoid fever have not proved satisfactory. Complex as the disease is, it is natural and proper to express by name the predominance of certain symptoms in a case or in an epidemic; hence we may speak of pneumo-typhoid, reno-typhoid, cerebro-spinal-typhoid, etc. The term *mild* (abortive, gastric fever) is used to describe the type in which the disease runs a short course and the symptoms—such as fever and diarrhœa—at no time become threatening. The term "*grave*" form explains itself.

In the very young and in the aged typhoid fever presents marked characteristics. In the former, the nervous symptoms commonly predominate, while the serious intestinal lesions rarely occur. Complications and sequelæ abound, owing, no doubt, to special susceptibility to disturbing influences on the part of young children. Among the former, bronchial catarrh, and among the latter, aphasia and other nervous troubles, scrofulous affections and bone-lesions may be mentioned. The mortality is very low. The aged are deficient in powers of resistance, and thus furnish a high rate of mortality from fatal nervous prostration, heart failure and pulmonary complications. For similar reasons, *i. e.*, lack of vitality, the fever in patients of advanced years is rarely as high and active as in younger subjects.

Relapse proper necessarily presents the pathognomonic features of the fever. Liability to it varies in different epi-

demics, ranging, according to different observers, from three to thirteen per cent. The fever of "recrudescence," and that of convalescence, is mild and lacks the pathognomonic symptoms.

Morbid Anatomy.—The symptoms of the disease suggest the anatomical changes which produce them. The characteristic lesion is intestinal, involving the glandular tissues, especially and primarily those of the jejunum and ileum, also of the large intestine. The fixation of the bacilli in the deeper glandular structure of those parts is soon followed by a well-defined *hyperplasia* with infiltration and resulting pressure on the blood vessels, giving the parts a pale, anæmic appearance; this condition is most marked from the third to the tenth day. Either resolution takes place or the morbid action continues, going through *necrosis* and *sloughing* (superficial or deep, especially severe near the ileocaecal valve, and occasionally involving large portions of the gut), with subsequent *ulceration*. The ulcers appear singly or in patches, with smooth, clean base, and soft (hence, easily bleeding), swollen, at times undermined, jagged edges; they are oval, rounded, irregular. It is at this time that perforation and severe hæmorrhage occurs from the extension of the necrosis through all the coats of the diseased intestine. Healing of the ulcers takes place by granulation, leaving a slightly depressed, often pigmented, surface. The mesenteric glands, the spleen, the liver, and the kidneys show evidence of deep tissue degeneration of a granular, fatty or waxy character, with liability to necrotic processes and, especially in the spleen, a tendency to rupture spontaneously or from slight injury, such as from rough touch. Myocarditis, with granular, fatty changes—more rarely endocarditis—has also been found after death. The arteries and veins may be similarly involved, and thrombi, especially femoral, have been noted.

Diagnosis.—The diagnosis of typhoid fever in the early stage should be made with caution. While the characteristics of the disease, as described in the lecture room and in a text-book, seem so pronounced as to forestall the possibility of mistake, the fact yet remains that disease, as found in the sick-room, does not frequently present the clear-cut picture with which the young practitioner is familiar. Yet, the gradual onset of the disease, the profound and early nervous prostration, the char-

acteristic rash and the temperature record, and later the pathognomonic intestinal symptoms and complications, are sufficient to establish the diagnosis.

Bronchitis and, more frequently, *pneumonia*, occurring as a complication of typhoid fever, may so cover up the case that the chief difficulty may be overlooked. Such a mistake might easily be made if it should so happen that the pathognomonic symptoms of typhoid fever are not well-pronounced.

Cerebro-spinal meningitis frequently resembles typhoid fever. A differential diagnosis in the earlier stage of the disease must largely rest upon a careful consideration of the surroundings. Keeping in view the fact that cerebro-spinal meningitis is a disease of rare occurrence, and the possibility of finding symptoms of meningeal irritation in connection with typhoid fever in its early stage, the prevalence of typhoid fever in the neighborhood, or a knowledge that local conditions and the season of the year are such as to favor the appearance of typhoid fever, would be important considerations. The appearance, later, of pathognomonic symptoms will establish the diagnosis.

Remittent fever and typhoid fever may be mistaken one for the other. This would most commonly occur in malarial districts, especially in cases of remittent fever characterized by unusual depression of the nervous system. But the face in remittent fever lacks the continuously stupid, drawn, haggard look of typhoid fever; it is at all times more animated, and during the pyrexia the redness is more vivid, with greater injection of the eyes. The early semi-jaundiced sallowness of the skin of remittent fever is wanting in typhoid, and while in the former the tongue may become dry, brown, and cracked, the tremulousness and unsteadiness with which it is protruded in typhoid fever is lacking in all save very exceptional cases: the pulse, also, is firmer and more resisting to pressure, unless in the late stage of a very protracted and serious case. While the nervous system may be profoundly affected, the depression is not so severe as in typhoid.

Acute miliary tuberculosis presents a totality of symptoms strikingly similar to typhoid fever when the respiratory organs are involved. Both have similar manifestations of bronchial and pulmonary involvement, a period of general inertia often

preceding the fever, and intestinal disturbances, even to bloody stools and splenic enlargement. The fever, however, of acute miliary tuberculosis is much more irregular and the remission may be from two to three degrees; breathing is more rapid and the cyanotic tendency more pronounced. The enlargement of the spleen does not occur so early, neither is it so marked. The typhoid eruption is wanting, although skin symptoms, usually numerous but isolated red spots, may be present in tuberculosis.

Prognosis.—The prognosis should be very guarded. It is difficult in the beginning to determine the probable severity of the case, neither can dangerous complications be anticipated and weighed. The general tone of the system and the patient's powers of resistance are important considerations. Struempell states that under modern treatment the average mortality is about ten per cent.

Treatment.—*Prophylaxis.*—Thorough drainage and supply of pure water for drinking and cooking constitute the most effective protection of a community against typhoid fever. A case of the disease having occurred, strenuous efforts must be made to find its origin, and all sources of suspected water must at once be cut off, and all water used for drinking or cooking, as well as all the milk used, must be thoroughly boiled; thus the bacilli are killed. Filtering alone is not sufficient.

In the sick room absolute cleanliness must be observed. Bed and bedding must be handled as little as possible, and the following rules, suggested by Fitz, should be observed: "Mattresses and pillows, when liable to become soiled, are to be protected by close-fitting rubber covers. Bed and body linen are to be changed daily. Bed-spread, blankets, rubber sheets and rubber covers are to be changed at once when soiled. Avoid shaking any of the articles. All changed linen, bath towels, rubber sheets and covers are to be immediately wrapped in a sheet, soaked in carbolic acid (1:40). Remove them to the rinse-house as soon as possible, and soak one hour in carbolic acid (1:40). Then boil the linen for a half-hour, and wash with soft soap. The rubber sheets and covers are to be rinsed in cold water, dried, and aired for eight hours. The bed-spreads and blankets are to be aired eight hours daily. Feeding utensils, immediately after using, are to be thoroughly

cleansed in boiling water. Dejections are to be received in a bed-pan containing half a pint of carbolic acid (1:20), in divided portions. The nates are to be cleansed with paper, and afterward with a compress cloth wet with carbolic acid (1:40). Add two quarts of carbolic acid (1:20), in divided portions, to the contents of the bed-pan; mix thoroughly by shaking, and throw the liquid into the hopper. The bed-pan and hopper are to be cleansed with carbolic acid (1:20), and wiped dry. The cloth used for the above purpose is to be at once burned. The corpse is to be covered with a sheet wet with carbolic acid (1:40). After the discharge of the patient from the hospital the mattresses are to be aired every day for a week. The bedstead is to be washed with corrosive sublimate (1:1000)."

The American Public Health Association recommends the following standard solutions:

Standard Solution No. 1.—Dissolve chloride of lime, of the best quality, containing at least 25 per cent of available chlorine, in pure water, in the proportion of four ounces to the gallon. Use one quart of this solution for the disinfection of each discharge. Mix well and leave in vessel at least one hour before throwing into privy-vault or water-closet.

Standard Solution No. 2.—Dissolve corrosive sublimate and permanganate of potash in pure water in the proportion of two drachms of each salt to the gallon. Use for same purposes, but must be left for at least four hours in contact with the material to be disinfected. It is odorless, very poisonous, and will injure lead pipes if passed through them in considerable quantities. Must not be kept in a metal receiver. The surface of the body of a sick person, or of his attendants when soiled with infectious discharges, should at once be cleansed with a solution of chlorinated soda, diluted with three parts of water, or with a two per cent solution of carbolic acid. As to the clothing, it must be kept for a half-hour in boiling water, and then laundered; this must be done at once upon removal from the person or bed of the sick.

Standard Solution No. 3.—Dissolve four ounces of corrosive sublimate and one pound of sulphate of copper to a gallon of water. Two fluid ounces of this solution to the gallon of water will disinfect clothing if thoroughly soaked with it for at least two hours, after which they may be wrung out and sent

to the wash. Soiled mattresses, pillows, feather beds, etc., cannot be effectually disinfected by sulphur fumigations, because the gas does not sufficiently penetrate them. Destruction by fire is here advised.

Free ventilation and cleanliness must be practiced. Neutralizing bad odors is not disinfection. Plastered walls and ceilings must be brushed over with one of these solutions, and then white-washed. The same treatment must be applied to the wood-work, taking especial pains to remove every particle of dust; this must be followed by thorough scrubbing with soap and hot water, and a prolonged exposure of the room to fresh open air by opening both doors and windows. Finally, sulphur fumigations (at least three pounds of sulphur to each 1,000 feet of air space), with usual precautions as to absolute closure of every aperture, will complete the process of disinfection.

General Management.—The patient must be put to bed at once, *and must remain there until well*. Do not attempt by internal medication to destroy the bacillus; the attempt is useless, and the patient will suffer from the administration of powerful drugs. Keep the room well ventilated, sunny, and at a temperature of 68° at the head of the bed. An extra lounge, *for the use of the sick one*, should be in the room, and the bed should be supplied with air cushions or water-bed. The patient must be kept scrupulously clean; his linen is to be changed as often as necessary to secure this end, but it is not wise to insist on daily change if the patient is fretted or tired by it. See that he is not allowed to remain too long in one position; have the nurse gently turn him from side to back, and direct that Florida water or Eau-de-Cologne be occasionally used to refresh him. Keep the mouth clean by frequent bathing with a soft cloth dipped in cold water, to which a pinch of borax may be added; thus excessive soreness of the tongue and lips may be largely prevented, and the danger of stomatitis, and even parotitis, materially lessened. Vaseline or glycerine should occasionally be applied to the lips.

The prevention of bed-sores is of great importance. To this end frequent bathing, especially of the sacrum and heels, in brandy, alcohol or spirits of camphor must not be neglected. If a bed-sore appears, it must receive the closest attention,

being kept clean and bathed in a weak solution of carbolic acid. German practitioners use an ointment of balsam of Peru, one part with thirty parts of glycerite of starch. Dusting with iodoform or some similar dry preparation is to be practiced if the sores are large, and the knife may have to be called into requisition if extensive necrosis develops.

The patient should not only be allowed to drink freely of pure, cool water, but the attendant must be instructed to administer cool water at short intervals. Water containing carbon dioxide is not to be allowed, since it increases gaseous distension of the intestine.

The diet, until convalescence is well established, should be liquid, and cool milk meets the requirements better than any other food. To an adult a quart of good, rich milk may be given daily, diluted with water; if more, it must be skimmed. Occasionally patients readily take quite cold milk when they rebel against it warm. I have never seen harm follow the use of cold milk when a craving for it existed; in fact, iced milk often agrees nicely and may relieve persistent vomiting. If, as is often the case, the patient tires of milk as an exclusive diet, or if he prefers sour milk, buttermilk, or koumyss, these may be used, at first with caution. The presence of curd or of copious oil globules in the stool—and pains must be taken to watch for these—denotes indigestion and counter-indicates the continued free use of milk. Chocolate, broths, blanc-mange, the white of egg beaten in water, baked apple, and later “Zwieback” soaked in milk or water, may be allowed. Thinly shaved raw beef may be relished for a change and answers well if dilute hydrochloric acid be used to aid in its digestion. Sometimes beer or a light wine (port, Hungarian) is acceptable.

That there is danger from the use of solid food before the intestinal lesion is well advanced toward recovery is generally admitted. Even after convalescence has been established, the patient, whose now craving appetite constantly tempts to violation of strict dietetic rules, should be watched so as to insure safe and complete recovery.

The *cool bath*, as now practiced, is a modification of and improvement upon the method of Brand, of Stettin, Germany, and has proved very useful in the treatment of typhoid fever.

The claims made in its behalf are in substance these: It diminishes the fever. By its tonic action it sustains the nervous system; under its use the "typhoid" state is modified, the intellect brightens, and experience shows that it lessens the tendency to pulmonary complications. The skin is kept in good condition, and bed-sores occur less often. It stimulates the action of the kidneys, thus favoring the excretion of typhotoxines. Its employment has lessened the death rate.

The bath is indicated whenever the temperature in the rectum reaches 103° , or more. If a bath-room is convenient to the sick room, it will prove very advantageous; if not, a bath-tub of full size must be placed near the bed. The patient is carefully lowered by sheets held at the four corners, immersed up to the neck, and supported by the attendant in order to prevent exhaustion. The temperature of the water should be from 85° to 90° , or even warmer if the patient is sensitive to cold; it may be gradually lowered by adding at brief intervals lumps of ice. The bath should be continued for ten or twelve minutes, gentle friction of the skin being maintained to prevent the patient feeling chilly. If the patient seems uneasy or cold, he is to be removed at once; otherwise, at the lapse of ten minutes he is lifted into bed, quickly wrapped in sheets and wiped dry, when the wet sheets are taken away, the patient covered, and given a bit of wine, brandy or food. If the effect of the bath is good, an examination of the temperature in the rectum (in typhoid fever the temperature should always be taken in the rectum) will within a half-hour show a lowering of from 2° to 3° . The frequency of the bath must be governed by the strength of the patient, the height of the fever, and by its effects on the patient. It may be given every three or four hours, and generally it is safe to maintain this both day and night until the hyperpyrexia has yielded. The physician must closely watch the effects, and discontinue the treatment the moment it proves unsatisfactory; neither must he overlook the fact that the irregular, too infrequent or unsystematic use of the bath defeats the object for which it is given. If pulmonary complications exist, the temperature of the bath must be higher; this applies also to cases where meningeal irritation is present; in the latter case cold water is to be poured on the head and back, protecting the ears by stopping with cotton or wool. Counter-indica-

tions to the use of the bath are: Too much fretting and sensitiveness on the part of the patient; excessive weakness; appearance of rheumatoid pains after the bath; peritonitis, intestinal hæmorrhage, otitis, laryngitis, nephritis.

Severe intestinal hæmorrhage may be relieved by the use of ice-bags on the abdomen; opium, in appreciable doses, by checking peristalsis and thus favoring the formation of a clot, may be advisable. In case of *collapse* stimulants are imperatively indicated. Of particular value are: Black coffee with cognac; camphor, grs. 2 to 5; musk, grs. $\frac{1}{2}$ to 1. Alcohol in any form. Nitro-glycerine. Cold water to the chest, to start breathing; artificial respiration.

Save in a crisis, or to meet special emergencies, the use of stimulants, in my own experience, has proved injurious rather than beneficial. Many practitioners endeavor to sustain vitality by ordering large amounts of alcohol, often from 8 to 12 ounces of whisky per day. Fully realizing the beneficent effects of stimulants in asthenic states, I expect better results from an occasional egg-nog containing not more than a teaspoonful of whisky than from larger amounts. My own favorite method is to add a teaspoonful of the best whisky or of absolutely pure alcohol to a glassful of cold water, at short intervals giving the patient a spoonful of this solution. This rule, of course, is not intended to apply to emergencies, when the doses must be appreciable.

Therapeutics.—So far, no remedy has been discovered which, infection having taken place, can destroy the bacillus and cut short the constitutional manifestation of its specific action. The disease is self-limited, and all that medicine can do is to sustain the vitality of the sick, to reduce to a minimum the mischief accomplished, and to meet the symptoms of the case as they arise. But this simple proposition embraces a great deal.

ARSENICUM ALBUM. The provings of arsenic show a remarkable similarity between the pathogenetic symptoms of the drug and the symptoms of this fever, covering not only many of the most important gastric, intestinal and urinary symptoms of the disease in various degrees of violence, but giving a graphic picture of the so-called typhoid state, with its utter prostration of the vital forces and other characteristic

manifestations in the nervous system, even in its minute details, including the slow, tedious convalescence itself and many of its most serious accompaniments.

The individuality of the remedy is such that it rarely proves of much value in trifling disorders; the very seriousness of a disease suggests arsenic. Its chief usefulness lies in cases which from the beginning betray intensity of morbid action, as shown by great exhaustion from very slight exertion and an early drifting into the typhoid state. The more pronounced these symptoms, the more useful arsenicum is likely to be. The general condition is one of great prostration and weakness, the slightest exertion being followed by faintness; this is often associated with a restlessness which makes the patient keep hands and feet moving incessantly and automatically. He lies stupid, perceives nothing, asks for nothing, complains of nothing. The tongue and lips are dry; the former is dark red, blackish, cracked, stiff, rendering speech difficult; the latter, and the teeth, are covered with sordes. The mouth is ulcerated. The pulse is small, frequent, often irregular; the flesh feels hot and dry, sometimes cold, with clammy perspiration; the cheeks may be hot and red. Delirium of a low character; coma rare; stools frequent, watery, dark, bloody, putrid, worse after eating or drinking. Urine scanty, high-colored, of cadaverous odor; retained. Gastric irritability. Great emaciation. Tendency to hæmorrhage from the orifices of the body. *Petechiæ*.

BAPTISIA has made an excellent record in the lighter forms of this disease. It is particularly useful in the so-called gastric fever, and in light doses of the mother tincture has aborted many cases in which no question as to the correctness of the diagnosis could be entertained. In the early stage of the fever the weariness is great; there is severe, dull, stupid headache; great aching and soreness of the body; pains in the bowels; uneasiness in the liver; slight tendency to vomit; yellowish coated tongue; fetor of the breath; mushy diarrhœa.

Later, and in graver cases, the characteristic "physical depravity" of the remedy is shown more plainly; the face is of a dark-red, livid color, with besotted expression; tongue dry, red or of a brown color, with reddish edges; the tired, bruised, sick feeling all over is very pronounced; sordes on the lips and teeth; the severe, dull headache continues; it is difficult to

rouse the patient, and there is a low, muttering delirium in which the patient fancies his legs are cut off, that a second self is in bed with him, lying by his side, or that he is kept busy putting himself together.

RHUS TOXICODENDRON stands between BAPTISIA and ARSENIC. It is well suited to persons of strong, vigorous constitution, and in the typical RHUS case there is less "lingering" than under ARSENIC. A feeling of "great illness," a sort of nervous apprehension, runs ahead of the disease, and when the attack begins the patient is overcome with the consciousness that he had a "warning;" hence, he gives up easily to the sense of weakness and favors himself, while in reality he is not as weak as he fancies; the ARSENIC case, on the other hand, is not conscious of the extreme exhaustion until after an exertion has demonstrated it.

The disease once fully declared, we find genuine and great weakness, with, at first, an over-excited state of the nervous system, with sensitiveness to light and noise, followed by corresponding depression and atony. A peculiar feature of the RHUS case is the evident consciousness on the part of the patient of the depression of the sensorium and of the reasoning powers, with seeming anxiety to cover this; eventually, however, the patient's thoughts become mixed and he surrenders himself to the characteristic typhoid state, talking and mumbling to himself. Other indications are: Predominance of *heat*, with redness of the face and injection of the eyes. Early and frequent bleeding from uterus and nose, followed by temporary relief of general symptoms. Greenish-brown diarrhœa, not nearly so offensive as that of ARSENIC and BAPTISIA. Urine looks like whey. Rheumatoid pains. Pulmonary congestion, with sticking pains in sides, short breathing and dry, hacking cough.

LACHESIS The patient is restless and loquacious; he jumps from one subject to another in an incoherent manner; there is stupor, dropping of the lower jaw, dry, red or blackish tongue, which is red at the tip and bleeding, and trembles on being protruded; the stools are horribly offensive, the abdomen sensitive to touch, and all symptoms are more intense after sleep. The fever is highest in the afternoon.

Ranking next in importance are the mineral acids, more espe-

cially PHOSPHORIC and HYDROCHLORIC ACID. They should be used in aqueous solution, just strong enough to give a slightly acidulated taste.

ACID PHOSPHORICUM. Especially useful in elderly people, with low powers of resistance, hence slow to recover. This lack of power to "react" furnishes the key to the symptoms which indicate its use. The depression shows itself *early* in the course of the disease, and is *general*. Fever and temperature are low, the latter even subnormal. As under BAPTISIA, the delirium is low: the patient is roused with difficulty, answers questions slowly, then sinks back into apathy; but the "foulness" of BAPTISIA is absent. Dullness of special senses, especially of hearing. Tongue pale, moist; skin loose, comparatively plump, clammy. Stools watery. Characteristic disorganization of blood, with ecchymosis and bleeding; the latter affords *no* relief. Threatening pulmonary complications, indicated by various crepitations and rhonchi, but little cough.

ACIA. HYDROCHLORICUM. MURIATIC ACID lacks the great prostration of PHOSPHORIC ACID; the symptoms are more aggressive; the typhoid state *proper* more pronounced. Trinks highly recommends it in the febris nervosa versatilis, with continuous, moderately active, but not violent, delirium, great acuteness of the special senses, general dryness of the mucous membrane, with slight congestion, keeping up the delirium and preventing rest. Pulse soft, rapid, from 110 to 130. Later, intermitting pulse, often every third beat; *febris stupida*; tongue so trembling and weak that the patient cannot protrude it; sliding down in bed; involuntary stools and urination.

When the intestinal symptoms are especially severe, a class of remedies may be called for of which MERCURY and NITRIC ACID are the most important.

MERCURIUS SOLUBILIS (or MERCURIUS VIVUS), used not lower than the third decimal trituration, is very valuable if after the first few days of illness hepatic symptoms show themselves, with great sensitiveness to slight pressure in the gastric, hepatic and inguinal regions; icteric hue of the skin. The tongue is flabby, moist; the stools are frequent, copious, greenish and slimy, with admixture of blood.

MERCURIUS CORROSIVUS is indicated by danger or evidence

of peritonitis, with tenesmus and bloody, slimy stools; "dysenteric" symptoms.

ACID. NITRICUM covers many important intestinal symptoms. Its action upon the mucous membrane is decided; it produces ulcers in the mouth and in the intestinal tract. Its concomitant symptoms are those of intestinal ulceration. There is great distension of the abdomen, with intense tenderness. The stools are green, slimy, acrid, fetid, and often accompanied with tenesmus. The appearance of the patient is pale, haggard; he is anxious, irritable, and, like the ARSENIC case, feels sure that he cannot get well. In case of intestinal hæmorrhage, especially with rapidly progressing emaciation and threatening pulmonary complications (rattling cough, brownish, bloody, purulent expectoration), it is a valuable remedy.

Other remedies are indicated by special conditions. Of these, PHOSPHORUS deserves especial mention because of its close relation to all states of adynamia and its action upon the respiratory organs. These alone suggest its use in cases with *pulmonary complications*. Its clinical record has been very satisfactory. BRYONIA is of use chiefly in light cases, with such gastric and hepatic complications as belong to the remedy; its characteristic "touchiness" and delirium (about the affairs, especially business, of the previous day) are also to be borne in mind. GELSEMIUM is of no use in the true typhoid state, but close relationship to malarial conditions suggests when it may prove of service.

In exceptional cases the brain-symptoms overshadow everything else. If so, ZINCUM, BELLADONNA, HYOSCYAMUS, STRAMONIUM, AGARICUS and OPIUM must be carefully studied. ZINCUM and OPIUM are of unquestioned value in widely differing conditions; the former in true inflammatory conditions of the brain and its covering, the latter in profound and characteristic coma.

Hale recommends Salicin for symptoms usually considered suggestive of quinine. He also speaks earnestly of the usefulness of Eucalyptol. "When taken into the alimentary canal, it mixes with and disinfects its contents, destroys or prevents the multiplication of bacilli, and neutralizes their toxic products." He recommends the tincture of EUCALYPTUS GLOBULUS in doses of five to ten drops every three or four hours.

The action of the heart may be embarrassed in the course of the disease, and in case of the involvement of the heart muscle, ARSENICUM, PHOSPHORUS and other remedies will come into play. Cardiac tonics, like DIGITALIS, STROPHANTHUS or CONVALLARIA, may be called for.

TYPHUS FEVER.

Synonyms: Exanthematic typhus.—Spotted fever.—Camp fever.—Hospital fever.—Ship fever.—Jail fever.—Famine fever.—Putrid continued fever.—Irish ague.

General Description and Causation: Typhus fever is an acute infectious disease, epidemic in character, intimately associated with want and filth. As one of the "plagues" of the dark ages, it frequently devastated entire and populous districts. With a clearer understanding of the rules of sanitation and with better living, it has largely disappeared. It is still met in Ireland, Great Britain, Russia, Poland, Mexico, and other countries where ignorance, poverty, overcrowding and want prevail. Only a few epidemics of typhus fever have occurred in this country; the first epidemic in the United States was that of 1812 in New England; the last, that of 1893 in New York. These were due to immigration. It is a question whether, or not, spontaneous cases ever occur.

The disease is highly contagious. Its specific poison is not only retained for a long time in the bedding and clothing of the sick, and is thus communicated to others, but it is readily transmitted to all who are forced into association with the infected person. Whether this is accomplished by the excretions and secretions, by the air exhaled, or by the scales which the epidermis throws off, is an open question; but it is well understood that exposure for any length of time involves great danger of infection, especially on part of the nurse, and that this danger is materially lessened if there can be had an abundance of fresh air in the sick-room. Thus Struempell states that "in the well-ventilated pavilions of the Leipzig hospital there have rarely been cases of transfer of the disease to physicians, nurses, or other patients." Since one attack of

the disease practically gives immunity from a second infection, the attending nurse, when possible, should be one who at some previous time has had the disease.

Typhus fever may appear at any season of the year. It affects all ages, with, probably, a preference for persons of from twenty to forty years old. As yet, no specific micro-organism has been discovered which meets the conditions of Koch's law.

Morbid Anatomy.—No changes, *post mortem*, have been noted. The dark, fluid condition of the blood, and the granular degeneration of muscular tissue repeatedly observed, present nothing peculiar to this disease alone. Enlargement of the spleen and catarrh of the bronchia are among the more important minor changes described.

Symptomatology.—In the larger number of cases the onset of the fever is sudden. There is a severe chill or rigor, followed by high fever, with full and rapid pulse, great prostration, headache, and pains in the back and legs. The chill may recur within a few days. The fever is high, at times with a temperature of 104° or 105° as early as the first evening, usually reaching its maximum within two or three days. Anorexia, with white, dry tongue, headache, vertigo, ringing in the ears, flushed face with dull, stupid expression, blood-shot eyes, vomiting, and symptoms of bronchial catarrh develop rapidly.

The eruption usually appears from the third to the fifth day, exceptionally as late as the seventh day; in rare cases it is very light and may even be absent. It first shows on the trunk, then on the extremities; the face is rarely involved; it reaches its fullest development within two or three days. "There are two elements in the eruption, a subcuticular mottling, a fine, irregular, dusky red mottling, as if below the surface of the skin some little distance, and seen through a semi-opaque medium (Buchanan) and distinct papular rose spots which change to petechiæ" (Osler). The hæmorrhagic, petechial character of the eruption constitutes one of the most striking features of the disease. Some observers maintain that a characteristic odor is noticed at this time. "*Pari passu* with the appearance of this eruption, there is exhaled by the patient a special characteristic odor—an odor which my great teacher Jimenez was in the habit of comparing to that given off by the domestic mouse. That observer considered this peculiar odor

of paramount importance, as he was never able to perceive it in those fevers which accidentally assumed the typhoid form" (Manuel Dominguez).

The temperature is not lessened with the appearance of the eruption, and the patient during the second week drifts into a condition which resembles typhoid fever in its great prostration and prominence of nervous symptoms. Delirium is constant; the pulse increases in rapidity and weakness; the face grows dusky, stupid and expressionless; he lies on the back unconscious, with eyes wide open, breathing rapidly and superficially; the tongue is dry, brown, cracked; the teeth and lips are covered with sordes; there is subsultus tendinum, picking at the bedclothes, and retention of urine. Death may occur from exhaustion.

In case of favorable termination, recovery takes place by crisis at the end of the second week. Commonly, after a deep sleep, the patient awakes refreshed, the temperature falls, the threatening symptoms disappear with surprising readiness, and, though gaining strength slowly, he makes an uneventful recovery, rarely interrupted by a relapse.

In some cases the onset of the disease is not sudden, as described, but the patient, before the appearance of the chill and fever; for a period of from seven to ten, or even twelve, days, suffers from lassitude, indisposition, weariness, and anorexia, with white coating of the tongue, dull headache, gastric discomfort, and heavy aching in the extremities. In cases of unusual severity the attack is frequently ushered in with exceptionally high fever, accompanied with delirium and other evidence of marked cerebral disturbance.

The fever, always high, is at its maximum about the fifth day, when the thermometer may register from 105° to 107° . At no time are morning remissions as marked as in typhoid fever; the maximum temperature once passed, remissions become somewhat more pronounced. After the crisis the temperature rapidly falls and may be below normal within twelve or twenty-four hours. A temperature of 108° , or more, indicates a fatal termination. *Pulmonary* symptoms in all severe cases are those of hypostatic congestion. The *urine* shows absence or decrease of chlorides, increase of urea and uric acid, and sometimes albumin.

Occasionally cases occur in which the symptoms are very light, with little fever and only trifling disturbance in the nervous system, recovery taking place in from ten to twelve days. On the other hand, cases are noted where the onset of the disease is violent, all the symptoms intense, and death takes place in a few days.

Complications and Sequelæ.—The complications most likely to arise are broncho-pneumonia, parotitis, jaundice and bed-sores; broncho-pneumonia is both frequent and serious. Osler mentions a tendency to gangrenous processes which has characterized some epidemics, and which involves the toes, hands, nose, and lungs; of the sequels, anæmia and post-febrile neuritis, resulting in paralysis, are the most important.

Prognosis.—In the young the rate of mortality is low; children rarely die of the disease; after middle age the rate is correspondingly high, even reaching fifty per cent. The average mortality is from twelve to twenty per cent. Of the 185 cases treated at the Riverside Hospital, on North Brother Island, New York, early in 1893, twenty-eight died. Death commonly results from toxæmia or pulmonary involvement.

Dominguez, a Mexican authority, speaking of typhus in his own country, gives a higher rate of mortality, stating that in the endemic form it varies from twenty to twenty-five per cent., including persons of all ages and sexes, and from fifty to sixty per cent. when the disorder takes an epidemic course. He adds that in Mexico the mortality is always greater among the higher classes of society. He also states that “concentrated pulse, the frequency of which gives to the beating artery under the finger the character of a soft, loose cord in continuous vibration” is a very bad symptom.

Diagnosis.—Typhus and *typhoid* fever may present sufficient similarity, symptomatically, to render a differential diagnosis a matter of no small difficulty, especially so in cases which appear to be sporadic. Taking into consideration the existence or non-existence in the neighborhood of cases of either disease, and the season of the year, the diagnosis of typhus fever must rest upon the more abrupt onset of the disease; the greater intensity of nervous symptoms in the early stage; the severity of the pains in the extremities and loins; the continuously higher temperature; the absence of marked and regular morn-

ing remissions in the fever; the absence of abdominal symptoms which are characteristic of enteric fever; earlier appearance of the rash, which is more extensive and of a pronounced hæmorrhagic character; the shorter course of the disease, and recovery by crisis. Whittaker says "there is bronchitis in both diseases, but there is also coryza in typhus fever, with irritation in the nose, sneezing, which almost never occurs in typhoid."—*Measles* and typhus, in children, have points in common. In measles, however, the catarrhal symptoms precede by two or three days the onset of the disease; in typhus they are concomitants. The eruption of measles appears in patches and early involves the face; that of typhus is much more generally and evenly distributed, and hardly ever involves the face. The character of the eruption almost always admits of differentiation, that of measles remaining macular, while that of typhus is petechial; the former disappears by desquamation in bran-like scales, the latter by absorption.—*Small-pox* may be mistaken for typhus, especially when it appears in a malignant form. One of the most valuable diagnostic points is the relief, especially lowering of the temperature, which in small-pox accompanies the appearance of the eruption. The eruption itself in variola first appears on the scalp, forehead and face; in typhus, on the trunk, extremities, rarely on the face; umbilicated vesicles, common in small-pox, are not seen in typhus. The hæmorrhagic tendency and bleeding from the mucous membranes is also more pronounced in small-pox.

Treatment.—The general directions for treatment of typhoid fever are applicable here. Isolation of the patient is of the greatest importance. Especial attention must be paid to the condition of the sickroom. Not only must there be an abundant supply of fresh air, day and night, but every unnecessary article of furniture must be removed from the room. Carpets, rugs, and clothing not immediately needed must be taken out at once and carefully disinfected. Absolute cleanliness and disinfection must be practiced unceasingly, for upon these depends not only the welfare of the patient, but the comparative safety of all who are obliged in any way to associate with him. The attendants must also look after their physical comfort, avoiding too much fatigue, and eating abundantly of nourishing and easily digested food.

The bath is efficient in the treatment of hyperpyrexia; the precautions enumerated in the preceding chapter must be observed. Everything must be done to economize the strength of the patient, and it is a matter of great importance not to permit unnecessary exertion on his part. The diet should be liquid, easily digested, but generous within the limits of safety. The bowels are to be kept open by the use of appropriate enemata (water and milk; strong warm soap-suds), and in case there is tendency to constipation, thin gruels may be fed freely. Slightly acidulated drinks may be allowed. Stimulants, judiciously used, are not objectionable.

Therapeutics.—Consult the remedies given under “Typhoid Fever.” Additionally

ACONITE will be useful in cases where the onset of the disease is very abrupt and symptoms of congestion are present, with great tension and excitement, especially in people of a nervous, sanguine temperament. The pulse is quick, hard, and sharp; the patient is “on the move” constantly, throwing himself rapidly and energetically from side to side; face and eyes flushed; great thirst; fullness in the forehead, with feeling as if the brain would start out of the eyes. Hard chill, or well defined rigor, followed by high fever, with pungent, hot skin.

VERATRUM VIRIDE in cases which from the beginning manifest great intensity of morbid action. The pulse is hard, quick, full, and bounding, and there is much irritation of the cerebro-spinal nervous system, with restlessness, boring the head into the pillow, jerking, twitching, tendency to convulsive action; he lies on the back, the thighs flexed on the pelvis; picking of bed-clothes, etc., subsultus tendinum. Tongue coated white; red streak in the middle.

Other remedies to be studied are: ARNICA, SECALE CORNUTUM, APIUM VIRUS; possibly in light cases, GELSEMIUM.

RELAPSING FEVER.

Synonyms: Relapsing Typhus.—Recurring Fever.

General Description and Causation: An acute infectious disease due to, or characterized by, the presence in the blood of

the spirochetes or spirillum of Obermeier, demonstrated in 1873. These micro-organisms under the microscope appear like dainty, narrow threads, from three to six times as long as the diameter of the red blood-corpuscle; they possess spiral and undulatory, snake-like motion, and may be seen singly or in knots of four to twenty. They are found only in the blood, and their increase in, and disappearance from, the blood goes hand in hand with the increase and amelioration of the disease.

Relapsing fever is in reality a filth disease. It has been observed chiefly in Ireland, on the European continent, and in India. It first made its appearance in the United States in 1844, and during its last visit (1869), which, like former invasions, was due to immigration, was studied in New York and Philadelphia. It is undoubtedly contagious, although much less so than typhus, for the observance of cleanliness alone affords protection against it. Age and sex are no factors, and one attack does not give immunity from subsequent attacks.

Symptomatology.—The onset of the disease is usually sudden. A chill, more or less severe, is quickly followed by high fever and severe constitutional symptoms, as great exhaustion, severe headache, occasionally delirium, loss of appetite, heavy and distressing aching and pain in the loins and extremities, with great soreness on touch. The temperature increases rapidly from the first, and within twenty-four or forty-eight hours may reach 106° , or more, the pulse ranging from 110 to 130. There is pungent heat of the skin, which is almost always of a dirty, jaundiced hue. The tongue is dry and thickly coated; the bowels are constipated, slightly loose. Great enlargement of the spleen, surpassing that of typhoid fever, is observed early; there is moderate enlargement of the liver, bronchial catarrh, apathy and mild stupor. The fever continues for five to seven days, often with morning remissions, which may be quite marked, the temperature not infrequently sinking to normal, and even lower, to return to its full marking in the evening. These remissions are more frequent and more pronounced toward the end of the first week than during the first few days. At this time a crisis occurs, quite often preceded by an unusual rise in the temperature on the preceding evening (*perturbatio critica*) and by copious sweating, a return to normal or slightly subnormal temperature, followed by relief of all the

constitutional symptoms, with a decided feeling of well-being. In rare cases the course of the disease terminates here. Usually, however, on the fourteenth day a chill again appears, followed by the same train of symptoms; it continues for nearly the same number of days, and again passes off by crisis. If a third attack occur, it will be shorter than its predecessors, presenting the same general characteristics. Occasionally, though rarely, there is a fourth and a fifth attack, but they are progressively lighter, and not often continue more than one or two days.

The highest temperature observed by Struempell at the Leipzig hospital was 107.9° , with an average of from 105.5° to 106.3° . The fall in the temperature following the crisis is great, not infrequently from nine to ten degrees; at Leipzig one case was seen in which it dropped to 92.1° . During the intervals slight elevations of temperature may occur as evidence of some constitutional irritation; a decided rise may precede the chill which marks the appearance of a relapse.

Complications are comparatively rare. In Germany epistaxis is common; hæmorrhagic nephritis and pneumonia are not rare; affections of the eye, especially iritis and iridochoroiditis, have also been observed. Abortion in pregnant women and post-febrile paralyses occur as sequels.

Variations from the course as described depend chiefly upon unusual mildness or unusual severity of the attack. Griesinger has written interestingly upon the "bilious typhoid" as it is observed in Egypt; it is a dangerous form of relapsing fever, with grave nervous symptoms, severe jaundice, hæmorrhagic tendencies, and frequently fatal termination. The spirilli are always present, and inoculation with them reproduces the disease.

Morbid Anatomy.—Struempell describes as especially important and characteristic "wedge-shaped white spots in the spleen" "like infarctions," which "become the starting point of pyæmic conditions or of peritonitis." Enlargement, with softening, is found in the spleen and liver; the kidneys and heart may be soft and swollen. Ecchymoses are sometimes seen.

Prognosis.—The rate of mortality during the last century was high; under modern treatment the prognosis is favorable.

During the last epidemic in Germany from two to four per cent. of all the cases terminated fatally, usually from pneumonia or nephritis.

Treatment.—An abundance of good, nourishing food and fresh air is of great importance. The severe muscular soreness and sensitiveness to touch renders the bath impracticable, and may have to be relieved by the use of chloroform liniment. It is of interest to know that quinine and salicylic acid, given perseveringly and in large doses, have utterly failed to affect the course of the disease or to prevent the recurrence of the paroxysms.

Therapeutics.—**ACONITE** is a valuable remedy during the first twenty-four or forty-eight hours; **BAPTISIA** with its "tired, bruised, sick-feeling all over," dull, stupid headache, and peculiar torpor and characteristic nervous symptoms, will be useful later.—**GELSEMIUM** is indicated by great languor, weariness, indifference, desire to be let alone. Dull, heavy expression of the countenance with, often, drooping of the eyelids; fever without thirst. Great weakness of the legs; drowsiness; wants to be still and sleep all the while during the day and in the morning. Hard aching in sacro-iliac and lumbar regions, running down into the thigh. Chilliness, with cold extremities and heat of the head and face. Constant perspiration, with languor and prostration; fever, followed by long-continued sweat, which comes on gradually and gives great relief, or by moderate sweat with copious emissions of clear, limpid urine.—**CHINA OFFICINALIS** is indicated by the clear-cut periodicity of the disease; jaundice, enlargement of spleen and liver; cachexia and great exhaustion. The relation of **CHINA** to conditions characterized by anæmia or depending upon a low, depraved state of the system is also to be remembered.—**EUPATORIUM PERFOLIATUM**. Bruised, sore pains in the back and limbs, severe bone-pains and headache, with internal soreness. Great soreness in the liver and epigastrium, with tenderness to pressure; sallowness of the skin; thick, heavy coating of the tongue, with much thirst and vomiting after drinking.—**ARNICA**, **MERCURIUS** (characteristic coating of the tongue; enlargement and sensitiveness of the liver; pains in bones and joints, worse at night and from warmth of bed; icterus), **PHOSPHORUS**, **PHOSPHORIC ACID**, and **BERBERIS** (enlargement of the spleen) and the remedies given under typhoid and typhus fever should be considered.

YELLOW FEVER.

(*Black Vomit.—Yellow Jack.*)

An acute infectious, non-contagious disease, originating in tropic countries, characterized by fever, jaundice, black vomit, and rapidly developing and profound prostration.

Ætiology.—It is conceded that yellow fever is due to a micro-organism which has not yet been isolated. The fever is endemic in the West Indies and other tropic countries, but in the course of ocean travel is carried to temperate zones, where it may become epidemic. It cannot exist in the frigid zone, and the advent of frost in any country suffering from it invariably affords relief. However, the experience had, among others, at Memphis (1879) demonstrates how tenacious of life is this specific germ, and its ability to hibernate and under proper conditions to reassert its virulence with the return of warm weather.

The disease for its development requires moisture and a temperature of about 75° F. It is conveyed by fomites, baggage, bedding, clothing, merchandise, and frequently by means of the bilge water of infected ships. It thus invades seaport towns and readily assumes the form of a local epidemic. The conditions which are favorable to its spreading are those found in large cities, as overcrowding of population and neglect of sanitary arrangements, lack of cleanliness, etc. The poor-quarters of a large city, in which such conditions are most pronounced, readily become the hotbed of the fever. Yellow fever prefers seaport towns and a low elevation, not to exceed 750 feet; yet, it has been known to travel inland, generally along the course of navigable rivers (Quebec, Portsmouth, N. H., 1798; Cincinnati and Gallipolis, 1887), and even to infect high mountainous regions. In Havana it is most active in June, July and August; in this country it appears in late summer and early autumn. The average duration of an epidemic is from six to eight weeks.

The virus keeps near the ground, and resembles malarial poison in that it is more effective during the night than during the day. Malarial and typhoid fever are prevalent during

epidemics of yellow fever, but do not occur together in the same individual.

No *sex*, *age*, or *race* is exempt. That men more frequently than women become its victims depends undoubtedly upon more constant exposure to the poison; it is stated that males between the age of twenty and forty years furnish the larger number of fatal cases, and that the very young and the aged more readily escape, probably because they are less frequently exposed; but neither extreme of life confers immunity. During severe epidemics a high rate of mortality has been observed among children less than five years of age. Negroes are less liable to infection than whites.

Long residence in a city which has been, or is, infected, affords a considerable degree of immunity; the unacclimated suffer severely, as forcibly illustrated in the Memphis epidemic of 1878, during which of the fifty-five unacclimated physicians who went there for the relief of the people, fifty-four had the fever. One attack, as a general rule, affords immunity from future attacks, but instances are on record where the disease occurred twice in the same person.

Fear, overwork, careless and irregular living, exposure, and all agents which lower vitality and the powers of resistance, may be classed among the predisposing causes.

Morbid Anatomy.—The internal organs present no characteristic changes; hyperæmia, hæmorrhagic extravasations and degenerative processes are present. Skin: jaundiced (hæmatogenous). Blood: dark, coagulates poorly, decomposes quickly; disintegration of red corpuscles. Liver: friable, in color from a pale yellow to an orange hue, with evidence of fatty degeneration and areas of necrosis. Kidneys: diffuse nephritis, cloudy swelling of epithelia of the convoluted tubes, with granular fatty degeneration. Alimentary canal: catarrh, with softening and ecchymotic condition of the gastric walls, the stomach as well as the intestine containing large amounts of black vomit. Fatty degenerative changes in the heart are not unusual. The icteric condition is general, as are also the hæmorrhagic extravasations, which are seen especially on the serous and mucous membrane.

Symptoms.—The stage of incubation continues from two to four days, or longer; there may be malaise, headache, back-

ache, loss of appetite and sense of prostration; again, a slight indisposition, with some weariness, may constitute the only deviation from health.

The disease proper presents three stages: 1) the paroxysm; 2) the remission; 3) the reaction and collapse.

The Paroxysm.—A violent chill suddenly sets in, accompanied with frontal headache, rheumatoid pain in the back and extremities, most severe in the legs and loins. There is vomiting and great prostration. Capillary congestion is marked, giving the patient an almost typical expression. "The dusky face with the deep suffusion of the eyes, in severe cases, is quite characteristic" (Sternberg). The eyes are congested, staring, sensitive to light. There may be sweating.

The cold stage having passed, fever follows, rising rapidly; the skin is hot and dry, the face flushed, the tongue furred, but moist, and there may be sore throat. The stomach is irritable, and soon vomiting sets in, first of mucus, then of bile, and at times of blood; the vomiting is violent and is readily provoked by pressure on the pit of the stomach. The mouth is dry, the gums sensitive and swollen, the bowels constipated, the urine scanty and albuminous from the start or after the second or third day. The skin may be hot and dry, or bathed in profuse, sticky perspiration; there is considerable restlessness, sometimes delirium. Jaundice appears on the third or fourth day, first in the conjunctiva, later it becomes general. The pulse, in proportion to the fever, is rather slow, rarely more than 110 beats per minute; it is feeble and compressible.

In children this stage may be ushered in by convulsions; sometimes there is no initial chill or cold stage.

This first, febrile, stage continues for two, or more, days; then the symptoms abate, and the *Stage of Remission*, or the *Calm Stage*, is reached. The temperature of the body now is normal or subnormal. There is considerable prostration, but the patient appears convalescing; and, in fact, in light cases convalescence begins here. More often, after a few days, sometimes after only two or three hours, the symptoms again increase in severity, the jaundice deepens, the urine grows more scanty, and *The Stage of Febrile Reaction*, or of *Collapse*, begins. The temperature rises again, reaching 103° or 104°; jaundice continues in an aggravated form; the secretion of

urine is arrested, and there are passive hæmorrhages from the mucous membrane. In some cases, with the development of these serious symptoms, the pulse-rate drops, possibly to forty beats per minute. The most constant expression of this hæmorrhagic tendency is the "*black vomit*." It is at times accompanied with much abdominal distress and consists chiefly of blood which oozes from the capillary walls of the congested and softened gastric mucous membrane and has been acted upon by the acid gastric juice of the stomach. In appearance it resembles coffee-grounds; it is made up of altered red blood corpuscles, epithelial cells, degenerated mucus, pigment, leucocytes, fatty matter, portions of food, and serum; it also contains various fungi. It is acrid, irritates the fauces, and in amount varies from a few drachms to several pints. Exceptionally "*black vomit*" is not present, but even in such cases examination after death usually shows its presence in the stomach and in the intestine. It is observed in nearly all fatal cases, but does not in itself determine a fatal issue of the case. In the same manner passive hæmorrhage occurs from the intestinal walls, giving rise to tarry, black, diarrhœic stools. Bleeding may also take place from the nose, ears, respiratory and urinary mucous membrane, and from the vagina and uterus. Pregnant women almost always miscarry.

The *icterus* in this stage may be intense, giving to the body a dark mahogany color, staining the perspiration and urine; it is due to a disorganization of the liver and reabsorption of bile. The *urine* is acid, of high specific gravity, deficient in chlorides stained by altered blood pigment, and contains granular and hyaline casts. If suppressed, uræmia will probably still further aggravate the already serious condition of the patient. If the patient recovers, the jaundice and other symptoms improve, with an average duration of the disease of six days. If the termination is fatal, a typhoid state may develop after the fourth day with deepening of jaundice, continued black vomit, muttering delirium, urinary suppression, at times convulsions, usually coma and death. In some cases delirium is not pronounced, but there exists a semi-consciousness of all there is going on, with a striking apathy and indifference. Hæmorrhage alone may prove fatal at any period of the disease, or a fatal collapse may suddenly occur, even in cases where the

patient is about, seemingly in no danger or quite well. Relapses are always to be dreaded. Death commonly takes place from the third to the fifth day of the disease.

Varieties.—At times the initial chill is wanting and the disease begins with fever; in others, there is no reaction after the cold stage has passed, the skin becomes livid, the pulse feeble, there is albuminuria, coma and death takes place on the second or third day; again, delirium and mania may initiate the attack, and constitute grounds for a very serious prognosis. The natural subdivision is into the *light* cases which, in the absence of an epidemic, easily escape recognition because of the derth of pathognomonic symptoms; second, the *severer* form, in which fever, jaundice and black vomit are present; and, third, the *malignant* form, which terminates fatally within a few hours or from two to three days.

Diagnosis.—In light cases the diagnosis may present serious difficulties, except as the presence of an epidemic or the existence of other grounds of suspicion may throw light upon the nature of the case. The diagnostic points are the existence of the disease in the community or knowledge of its importation, albuminuria, fever, icterus, and black vomit.

Light cases resemble *malarial* fever; the salutary effect of quinine, the enlargement of spleen, the distinct periodicity of the fever, the absence of albuminuria and of black vomit, prove the malarial character of the fever. *Dengue* fever has the characteristic and persistent pains, and frequently is of a distinctly remittent character. Typhoid fever, relapsing fever, local jaundice, acute yellow atrophy, and other affections which present isolated points of similarity to yellow fever not only lack its specific ætiological factors, but differ from it sufficiently in their clinical history to allow a ready diagnosis.

Prognosis.—The prognosis must always be guarded. The mortality in various epidemics differs greatly, ranging from 15 to 80 per cent. It is greatest during the height of epidemics, severest among the improvident classes, hard drinkers, bad livers, and among persons who are exposed to hard labor, worry, or are generally debilitated. Persons not acclimated fare badly; plethoric people are said to be unpromising cases. Results in private practice are much better than those obtained

in public institutions. Three-fourths of the deaths occur in the first week of the disease.

Favorable symptoms are: low fever; temperature below 103.5° ; slight jaundice; slight hæmorrhagic tendency; moderate albuminuria; comparatively free secretion of urine. Unfavorable symptoms are: unusual violence of the initial paroxysm; copiousness of black vomit and unusually pronounced hæmorrhagic tendency; early and intense jaundice; pregnant or puerperal state; suppression of urine; excessive and early capillary congestion; marked brain symptoms; embarrassment of respiration and of the heart's action.

Treatment.—Prophylaxis.—"Isolation, disinfection, depopulation" have justly been said to be the summing-up of the prophylaxis of Yellow Fever. Ship quarantine is of the greatest importance, because, effectively maintained, it affords the only means of protection against importation of the disease from foreign parts. The establishment of sanitary cordons (as in Texas, 1882, and in Georgia, 1893), and of Camps of Probation or Detention (as Camp Mitchell during the Memphis epidemic of 1879, Camp Perry, in Florida, 1888; at Waynesville, Georgia, in 1893), not only greatly reduce danger of importation, but afford the best means of prompt recovery to persons already endangered by exposure.

The necessity of thorough disinfection of all articles which may become disease carriers, and of persons exposed, also of correcting sanitary conditions in localities invaded or threatened, is self-evident; the means of accomplishing this have been discussed. Depopulation is accomplished by prompt removal of those not yet sick and who can be spared from attendance upon the sick, to favorable localities, especially to camps properly situated, where they can live a simple, well regulated out-of-door life. Where duty makes such a removal impossible, careful attention must be given to the maintenance of good health; unnecessary exposure, as visiting the infected portions of a city, and all excesses, worry, and special drafts upon the vital forces must be avoided.

The treatment of the patient requires promptness of action and skill in meeting emergencies. The use of hot water during the pyrexia is grateful and effective; sponging in tepid, cold and hot water has been practiced with good results. Shaved

ice may relieve thirst and vomiting. Emergencies must be met as they arise. Abstinence from food is urged by physicians of large experience, absolutely so during the first stage; when feeding is resumed, it should be done with the utmost care; at first meat broths in small amounts may be given, closely watching the effect; the patient must not be allowed to raise his head from the pillow. Feeding per rectum may become necessary at any time, and has given satisfactory results. Beer and champagne are said by some observers to have been borne well in all stages of the disease.

Therapeutics.—Falligant, an eminent Southern physician of extensive experience in the treatment of yellow fever, recommends in the *first* stage: ACONITE, BELLADONNA, IPECACUANHA, CHINA, NUX VOMICA; in the *second* stage: BELLADONNA, BRYONIA, ARSENICUM, NUX VOMICA, SULPHURIC ACID, PLUMBUM ACETICUM; in the *third* stage: SULPHURIC ACID, ARSENICUM, CROTALUS, LACHESIS, ARGENTUM NITRICUM, PHOSPHORUS, CARBO VEGETABILIS.

ACONITE.—In the first stage and for a short time only, with the usual characteristic symptoms; nausea and vomiting, heat in the stomach, anxious breathing, pain in the region of the heart; pain in the back and extremities. Falligant advises a solution of five drops of the tincture in six ounces of water in alternation with BELLADONNA, similarly prepared, every half-hour until the fever has declined, probably for twelve to twenty-four hours, with hot mustard foot-baths every six hours.—**BELLADONNA.** Characteristic heat, redness of face, sharp, shooting, throbbing (frontal) pains in the head and ears. Symptoms of active congestion. Dry, hot tongue and throat. Nausea and violent vomiting. Burning and throbbing in the pit of the stomach. Head and body hot, feet cold. Urine red or brown. Later, characteristic cerebral symptoms, delirium, cystic hæmorrhage, convulsive action, swelling of the glands. Typhoid state. Glandular affections during convalescence.—**IPECACUANHA.** Gastric symptoms, as nausea and vomiting, with pronounced aversion to food. Constant feeling of sickness at the stomach, with great relaxation of the system and weakness. Vomiting of black, pitch-like masses.—**CHINA.** Diarrhœa most prominent, with weakness and debility; profuse, frequent,

putrid, dark, painless. Copious emissions of flatus, without relief. Typhoid condition.—**BRYONIA**. Occipital headache, extending down the neck and shoulders, worse from motion; general muscular soreness all over, especially in the back; pain in the eyes when moving them; burning thirst, with aggravation of the gastric symptoms from drinking; fulness and oppression in the pit of the stomach and bowels; sharp, stitching, pleuritic pains. Icterus. Anxiety and fear about the future. Typhoid condition.—**ARSENICUM**. Great thirst, wanting to drink often and small amounts at a time, with increased gastric distress and vomiting after drinking. Vomiting of watery, then bilious, then dark, black, coffee-ground substance. Pressive, burning pain in the pit of the stomach; cramps in the bowels; painless, watery, or involuntary diarrhœa; diarrhœa of dark, offensive stools; oppression of the chest; suppression of urine; irregular, small, rapid, trembling pulse. Internal heat and external coldness. Coldness of the body to touch, with sticky, clammy perspiration. Great anxiety and restlessness. Face haggard, yellowish, livid, or deep, dull red. Eyes dull and sunken; nose pointed. Hippocratic countenance. In the second stage, when gastric symptoms continue. Hæmorrhage, uterine or cystic. Typhoid form.—**CROTALUS**. Neidhard, and others, have called attention to the value of the snake poisons, suggested largely by their action upon the blood and their close relation, homœopathically, to hæmorrhagic states. Cinical experience with both **CROTALUS** and **LACHESIS** has been extensive and satisfactory. The indications furnished by the Yellow Fever Commission are: delirium with open eyes; utter apathy; confused speech; disconnected answers, with coldness of the skin and rapid pulse; terrible headache, with red, puffed face; face yellow, sometimes of a leaden color; blood flows from the eyes, ears, and nose, indeed from all the orifices of the body, even bloody sweat; thirst; sour, acrid eructations; scraping, rancid sensation down the œsophagus to the stomach; extreme nausea and vomiting from the least exertion; vomiting of bile, of blood; swelling of the whole abdomen; enlargement of the inguinal glands; bloody stools, sometimes involuntary; hæmorrhage from the urethra; painful retention of the urine; menses anticipate; hoarse, weak, rough voice; pains in chest; pulse slower than

natural (sixty beats) or intermitting and scarcely perceptible; pains in bones; deep yellow color of the whole body; purple spots; extreme depression of the vital powers; spasms; death by syncope; acts more on right side.—**ARGENTUM NITRICUM**. Holcombe recommends it in the later stage, especially for the relief of the black vomit when other remedies have failed to reach it. Hardenstein advises its use when there is much brain irritation, with violent headache, vertigo, sharp pains in the head extending from the occiput forward, with bending the head backward.—**LACHESIS**. Delirium at night; loquacious, disposed to quarrel; slow, difficult speech; drowsy; rush of blood to the head; red face; yellow conjunctiva; yellow or purplish tint of skin; blood dark, non-coagulable; small wounds bleed much; perspiration stains yellow; lips dry, cracked and bleeding; tongue heavy, trembling, dry and red, cracked at the tip; tip red, center brown; difficult speech; sour eructations; heartburn; nausea after drinking; vomiting, with palpitation; dyspnoea; anxiety about the heart; cannot lie on left side; irregular, weak pulse; urine almost black; persistent sleeplessness; fainting, trembling all over; sudden flushes of heat; sensitiveness about the neck and pit of the stomach against any pressure; worse when waking; better after nourishment; acts more on the left side.—**NUX VOMICA** is of value during convalescence, when there is a tendency to constipation.—**MERCURIUS SOLUBILIS** may be useful if biliousness and irritability of the stomach remains.—**HYOSCYAMUS**, **OPIUM**, **STRAMONIUM**, and others of this class, if brain symptoms (convulsions) predominate.—Typhoid symptoms, in addition to **ARSENIC**, **BRYONIA**, **CROTALUS** and **LACHESIS** may point to **BAPTISIA**, **CIMICIFUGA**, **RHUS TOX.**, **SULPHURIC ACID**. The latter has the hæmorrhagic tendency, great prostration, rapid sinking, thick, soft pulse, general trembling, vomiting, and diarrhoea of an extremely fetid character. It has proved of value in several epidemics. The pure acid should be used in sufficient strength to slightly acidulate the water. Urinary suppression may demand the exhibition of **CANTHARIDES**, which Holcombe, and others, found quite reliable.—Collapse may warrant the use, in addition to stimulants, of **CAMPHORA**, **CARBO VEGET.**, possibly **ACONITE**.—**CUPRUM** is said to follow **ARSENIC** and to be an excellent remedy for black vomit. Falligant claims that the only remedy he has ever

known to do any good in suppression of urine was a mixture of a teaspoonful of NITRE, a teaspoonful of GIN, and a wineglassful of watermelon-seed tea mixed, given at one dose. "Three to four successive doses secured a resecretion of urine in several of my latest black vomit cases in 1876, the previous emptiness of the bladder being unquestionably proved by tests with the catheter."

MALARIAL FEVER.

Synonyms: Paludal fever.—Ague.—Fever-and-ague;—Marsh fever.—Swamp fever— Intermittent fever.

A type of fever characterized by marked periodicity, with intervals of freedom from specific symptoms, manifesting itself in forms which greatly differ in their clinical history and gravity, but are always accompanied by the presence of a vegetable micro-organism (the hæmatozoa of Lavéran) in the blood.

Ætiology.—Malarial fever is endemic in all regions and countries save the frigid zone. It is most frequent and malignant in tropical and subtropical countries, where the conditions essential for its development, *i. e.* heat, moisture, and rank vegetable growth, are most fully met; its distribution, however, in temperate climates is very extensive. It abounds in low, swampy grounds, with abundant vegetation, estuaries, and salt-water, swamps, badly drained lands, particularly in low swampy grounds once cultivated but allowed to relapse, and in low lands after a recent overflow. It has also developed in the bilge water of ships at sea. Places are, however, known which meet all the conditions and are yet free from malarial fever; such are the marshy districts of Ireland and the lake of Tescudo, in Mexico.

The disease may also develop in persons who have left a malarious region and have settled in a country where malarial fevers occur never or very rarely, and in those who visit the seashore after having for years lived inland in malarious districts.

In tropical countries it is most common in autumn, less so in

spring; in temperate regions it shows a preference for September and October, including early November. Extremely dry or extremely wet weather appears to check it in temperate countries.

The miasm itself is of low specific gravity, hence does not readily rise beyond a certain height; to this fact is due the comparative safety insured by sleeping in the upper story of a house and by building on high ground. It is abundant in the lower atmosphere and is carried on currents of air; exposure to such miasm-laden winds results in outbreaks of fevers on part of those exposed to them, as in the Roman Campagna. It is especially active at the time of sunrise and sunset. Exposure to draughts of cold air, in tropical countries, after being out in the hot sun, is known to have precipitated an immediate attack of the fever.

A low altitude is generally associated with malarial influences, but malaria also exists in high elevations.

Sex, age or race have no bearing upon the ætiology of malaria. It is not proved that negroes are less liable to it than the Caucasian race, save as in accordance with the operations of the law of acclimatization. Men furnish a larger number of these cases than do women; this fact undoubtedly is due to greater and more frequent exposure of men while at work in marshes and other malaria-infected places.

The malarial parasite, extensively studied by Lavéran and others, is a vegetable micro-organism found in the blood of man and of some of the lower animals; it occurs in abundance during malarial fever, and at no other time. It enters the system with the inhaled air and through the alimentary canal, chiefly with the drinking-water. A temperature of not less than 60° F. appears necessary to its existence.

Various forms of the hæmatozoa are seen in the blood of malarious patients, and these are closely connected with the different manifestations of the poison and the particular form of the disease produced. "Golgi has described two distinct forms which he considers the cause of tertian and quartan fevers, and makes all other types depend on combinations of these. This probably holds good for a large proportion of intermittents. With the remittents, Marchiafava and Celli have described a distinct species, and look upon the crescents as

representing a phase in its development. The pernicious malarial fevers are also associated with this variety, which the Italian observers call the 'small plasmodium.' The crescents may occur also in acute cases, but are most constant in malarial cachexia. The flagellate bodies do not appear to have any definite relation to the different forms of the disease." "The general symptoms and the morbid anatomy of malaria are in harmony with the changes which this parasite induces. The destruction of the red blood-corpuscles by it can be traced in all stages. The presence of the pigment in the blood and in the viscera, so characteristic of malaria, results from the transformation of the hæmoglobin by the plasmodia. The anæmia is the direct consequence of the wide-spread destruction of the corpuscles by the parasites. The constancy of their presence, the fact of their causing rapid destruction of the red blood-corpuscles, and the remarkable coincidence of their disappearance contemporaneously with the symptoms of the administration of quinine, are points strongly in favor of their ætiological relation with the disease. There are still many gaps in our knowledge. We do not know how the parasite enters, or how or in what form it leaves the body; how and where it is propagated; under what outside conditions it develops, whether free or in some aquatic plant or animal. No record of its successful cultivation has been published." (Osler.)

Although in all forms of malarial poisoning the essential cause is the same, it is practical to recognize certain clinical types of which the following are especially important: intermittent fever, remittent fever, pernicious malarial fever, and chronic malarial poisoning.

INTERMITTENT FEVER.

Morbid Anatomy.—The most important changes are as follows: *spleen*: engorgement and enlargement during the fever, which at first disappears during the "interval" (*i. e.* the time which intervenes between the beginning of one paroxysm and that of the next), but eventually may become permanent ("ague-cake"), and which may be sufficient to cause the organ to extend as low as the umbilicus. The size of this enlargement does not necessarily depend upon the duration of the disease. In very rare cases *rupture* of the spleen, spontaneous

or from traumatism, may occur, with fatal hæmorrhage into the peritoneal cavity. *Liver*: enlargement and tenderness upon pressure. *Blood*: lessening of the number of red and white corpuscles.

Clinical History.—The period of *incubation* usually is from seven to fourteen days; in exceptional cases the first symptoms show themselves within twenty-four hours after exposure; again, a person may have been exposed to malarial influences for a great length of time, and not have intermittent fever until removal to some non-malarious country. This form consists of regularly recurring paroxysms of chill, fever, and sweating, which follow each other, at times with clock-like regularity.

The *chill*, or *cold stage*. Its onset is gradual or sudden. If gradual, there is usually some indisposition, possibly a vague sense of coldness and a dull headache, with lassitude. By degrees the chilliness increases; it is most noticeable, often, in the back and loins, and from there extends all over the body. There is yawning, stretching, bitter taste in the mouth, pale coated tongue, and increasing headache. Eventually, in the typical case, the chill becomes pronounced; the teeth chatter; there is great pallor of the face, which looks haggard and sunken; the surface of the body feels cold to the touch and is pale, dry and rough ("goose flesh" or *cutis anserina*); the patient vainly endeavors to find relief from the intense coldness by the use of any and all covering within reach. The muscular rigors are often so severe as to shake the bed; the tips of fingers, ears and nose are livid; the voice is husky and faint; respiration is hurried and often labored; the pulse is quick, small and hard; contraction of the peripheral vessels causes vascular congestion of the viscera, enlargement of the spleen, with tenderness on pressure in the region of the spleen and liver. The surface temperature is reduced, but taken in the rectum or axilla the thermometer may register 104° to 106° F., the fever not infrequently almost reaching the maximum point during this stage. In severe cases symptoms of collapse may appear. If the onset of the cold stage is sudden, the chill develops rapidly and usually is severe, resembling the chill of croupous pneumonia and of cerebro-spinal meningitis. The cold stage continues for ten or fifteen minutes to an hour, and longer.

The *hot stage* begins with a lessening of the intense coldness and with transient, comforting flashes of heat. The peripheral vessels relax, the blood returns to the surface, relieving the congested inner organs, and the face flushes. The surface of the body becomes burning hot, smooth, dry, red. The throat is parched, and large draughts of cold water are eagerly taken; the lips are often blistered, the tongue heavily coated, the breath foul; there may be nausea and vomiting; the patient suffers from severe throbbing frontal headache; the pulse is full and bounding, 120, or more, beats to the minute, sometimes dicrotic. There frequently is intense restlessness and irritability, but rarely delirium, save in children. Dizziness, ringing in the ears and *muscæ volitantes* may be present. The temperature remains high, possibly reaching 106° , or even more, though not infrequently there is only slight increase—from 0.5° to 1.0° —over the maximum temperature reached during the cold stage.

This stage lasts from one to several hours, rarely more than five or six.

The stage of *sweating* appears with moisture on the forehead and face, gradually and often rapidly involving the entire surface; it culminates in a profuse, drenching sweat, accompanied by relief of all the symptoms, the patient, in a majority of cases, dropping into a quiet, restful sleep from which he awakens greatly refreshed. This stage lasts from two to four hours, or longer.

During the intermission between the paroxysms the patient may be about as usual, but slightly indisposed.

In the intermittent fever of *children* the hard chill and shaking are generally absent, dulness, drowsiness, and coldness of the surface, with coldness and lividity of the face and extremities, supervening. The hot stage in most cases is well pronounced, and there is a tendency to convulsive action and even coma. The sweating is not prolonged or severe, and may even be wholly wanting. Bronchitis, more often than in adults, complicates the fever.

The *temperature* of intermittent fever may be very high, remaining so for some hours, without causing alarm. Parke (Personal Experience in Equatorial Africa) is frequently quoted as stating that he has seen every officer in the Emin Pasha

relief expedition march all day with temperature of over 105° F. The temperature rises more rapidly than it falls, continues at its maximum for one to three, or more, hours, and declines, sometimes uniformly, but often one or two degrees at a time, remaining stationary for a half hour or more, then to fall again, and eventually reaching a subnormal condition (from one to one and a-half degrees below normal). The *urine*, during the cold stage, is frequently increased in amount and loaded with waste products. The excretion of urea is greatly stimulated during the paroxysm; it is, indeed, observed for two hours before the chill, thus affording a clear-cut indication as to the precise time when quinine should be given for the purpose of anticipating the chill.

Types and Variations.—The paroxysms nearly always occur with remarkable regularity, either at the end of 24, 48, or 72 hours. If occurring at the expiration of 24 hours from the beginning of the preceding paroxysm, the fever is said to be of the *quotidian* type, a common type of intermittent fever. If the “interval” is 48 hours, the paroxysm occurring every third day, the fever is of the *tertian* type,—a common type. If the interval is 72 hours, the paroxysm recurring on the fourth day, it is a “*quartan*” fever,—a type much less frequently seen.

Usually the paroxysms appear at the same hour, in the quotidian and tertian type in the forenoon; in the quartan type, shortly before noon or in the afternoon. The intervals, however, may be shortened or lengthened, thus giving rise to the “anticipating” and “retarding” or “postponing” form; if the paroxysm is “postponed,” the disease is growing lighter.

All these types may be duplicated in the same person, and we may thus find, for instance, a *double quotidian* fever, two distinct paroxysms occurring during every 24 hours; or the various types may combine, giving rise to exceptional complications in type, which, because of their infrequency, are of slight practical importance.

Again, the stages of each paroxysm may not be equally pronounced. If there is no cold stage, the case becomes one of “dumb ague;” sometimes there is neither cold nor sweating stage. Or the stage may last so long as to have the last, the “sweating,” stages, of one overlap the cold stage of the suc-

ceeding attack; or neurotic symptoms, as neuralgia, may take the place of the cold stage; or the malarial poisoning, though unmistakable, may give rise to general indisposition, with *bilious* symptoms, slight fever and great lassitude (*latent intermittent fever*), or to periodically recurring attacks of neuralgia, preferably of the supra-orbital or infra-orbital branch of the trigeminus (*masked malarial fever*), which takes the place of the regular paroxysm.

Duration and Prognosis.—Intermittent fever, after a few paroxysms, may disappear of its own accord; if so, it is liable to recur. As a rule, a favorable prognosis may safely be made.—There are found stubborn cases with great impoverishment of the blood and extensive destruction of the red blood corpuscles by the parasite, leading to anæmia and jaundice. The possibility that a case may become chronic must also be kept in mind.

Treatment.—The specific relation of quinine to intermittent fever is firmly established; it is useless to deny its antagonism to the vegetable parasite or its power to destroy it. The position of the dominant school of medicine, therefore, is strong in the claim that the quinine-treatment is scientific. On the other hand, clinical experience, too extensive to be ignored, has shown that remedies homœopathically indicated are also capable of yielding good results, and that in many cases the treatment with quinine has in the long run proved much less satisfactory than the action of the homœopathically indicated and potentized remedy.

If quinine is used, it should be used intelligently and with due care not to produce violent symptoms of cinchonism; hence, the susceptibility of the individual to the action of quinine should be considered. The drug should be given in solution whenever the patient can bear it in this form; if this is impracticable, wafers or gelatine capsules should be used. In small children, rectal suppositories or inunction of the abdomen with quinine-ointment, followed by energetic rubbing, may be made to answer the same purpose.

The majority of the clinicians of the dominant school, for good reasons, prefer one or two large doses “carefully timed so as to meet the paroxysm, so that one dose shall not be eliminated before the next exerts its influence” (W. G. Thompson)

to smaller doses distributed during the twenty-four hours; thus, thirty to forty grains, four or five hours before the paroxysm, are advised in a very severe case. Osler says, "The mode of administration is of little moment so the patient gets a sufficient quantity into his system. I have a number of charts showing that grain-doses three times a day will, in many cases, prevent the paroxysm, but not always with the certainty of the larger doses. It is safer to give at least from twenty to thirty grains daily for the first three days, and then to continue the remedy in smaller doses from two to three weeks." The quinine should not be administered during the paroxysm; it then accomplishes nothing, and may greatly distress the patient; its maximum effect is not obtained until four or six hours after its administration; hence, in the quotidian type it should be given eight hours, in the tertian twelve hours, and in the quartan type fifteen to eighteen hours, before the expected chill, and repeated.

As a preventive for those obliged to visit malarial districts, quinine should be used three times daily in doses of from two to four grains. The bisulphate of quinia is a favorite now with many practitioners.

The remedies which have proved most reliable when indicated homœopathically are: EUPATORIUM PERFOLIATUM, EUPATORIUM PURPUREUM, GELSEMIUM, NUXVOMICA, CEDRON, IPECACUANHA, QUININE, CHINA, ARSENIC, NATRUM MURIATICUM.

EUPATORIUM PERFOL. The paroxysm usually occurs between 7 and 9 o'clock A. M. It is preceded by great thirst, which continues throughout, but drinking provokes vomiting; "bonepains" are very severe and persistent, hardest before the chill; great, general muscular soreness, especially of the eyeballs, head and chest; the gastric symptoms are severe throughout. The chill starts from the back; the cold stage is persistent, the hot stage lighter, and sweating moderate. Loose cough during the intermission. I have verified Hale's statement that often a weak infusion acts promptly when the tincture or the dilutions have failed.—EUPATORIUM PURPUR. The paroxysm comes on at different times in the day; the chill is preceded by muscular aching in the extremities; it begins in the small of the back; "bone-ache," with deep aching and numbness of the legs; violent shaking, with comparatively slight

actual coldness; hot stage prolonged and marked; sweating moderate and on the upper part of the body. During the intermission, dizziness, with sensation of falling toward the left side; dull pain in the kidneys; frequent and painful desire to urinate, with weakness and faintness after urinating.—**GELSEMIUM**. Chill in the afternoon or evening, commencing in the hands or feet, running up the back; without thirst; at 10 A. M.; at the same hour of the day. Hands and feet very cold, with heavy, severe headache; fulness in the head and sense of heat in the head and face. "Nervous chill." Hot stage marked and long-continued. Face looks congested, stupid, bluish; without thirst; wants to be let alone, unwilling to be disturbed. Wants to sleep; often slow to arouse from sleep. Sweat moderate, most profuse on the genitals. Tongue coated yellowish, pasty. Gastric symptoms not pronounced. After cessation of sweating he urinates often and freely; white limpid urine. Great exhaustion and muscular weakness during the apyrexia.—**NUX VOMICA**. The paroxysms are irregular, in the morning or late in the evening. The chill is hard, with blue face and nails, shaking, intense thirst, not relieved by drinking water. Severe ache in lumbar and sacral region, with paralytic numbness of the legs; in the hot stage the thirst continues, the most characteristic feature, however, consisting of the patient's inability, in spite of the bodily heat, to have the covering removed, on account of the shivering which immediately seizes him; he cannot bear to have the air touch him. Sweating is commonly profuse and relieves the aching in the legs; he must keep himself carefully covered up, as the air chills him. Gastric and bilious symptoms are present throughout the paroxysms and the intermission, as: nausea, vomiting, abdominal uneasiness, colicky pain, constipation. Nux cases frequently have a great desire for beer, especially during the hot stage. Useful in "dumb ague," with "bilious" symptoms. "Anticipating" intermittents.—**CEDRON**. Perfect regularity in the appearance of the paroxysms, the chill usually appearing about 3 A. M. or 3 P. M. Preceded by mental depression and headache. Begins in the back, with icy coldness of hands and feet, made worse from the slightest motion; the cold stage is well marked and accompanied with severe frontal headache. Heat with thirst for warm drinks; numbness and weakness of the legs.

Copious sweating without thirst. The intermission is marked by great debility and general indisposition. The stages are not clear-cut, but overlap; the fever may be ushered in with an attack of supra- or infra-orbital neuralgia.—**IPECACUANHA.** The chill is preceded by yawning, stretching, and the collection of saliva in the mouth, and accompanied with persistent nausea, vomiting, diarrhœa. There is rarely thirst during the cold stage; decided aggravation from the application of external heat. The hot stage lasts a long time, with much thirst and gastric irritability throughout. Oppressed breathing; dry, hacking cough; unequal distribution of heat; head and face hot; one hand hot, the other cold. The sweating is not profuse; soursweat; turbid urine; feeling as though very ill, during the sweating. The gastric symptoms continue all through the paroxysm and the intermission; thirst is rarely great during any stage; the stages often are not clear-cut; there is much faintness and "goneness" at the stomach. Is said to be especially useful after the abuse of **ARSENIC** and **QUININE.**—**QUININE.** The paroxysms are regular and distinct. The cold stage is accompanied with painful tenderness in the dorsal region, which lasts into the hot stage, with much tenderness on pressure; the temperature ranges high; there is pungent heat of the surface, great thirst, highly flushed face, possibly delirium. Sweating breaks out gradually and is copious. There is continued pain in the lower spine. Swelling of the spleen, with soreness on pressure in the spleen and liver. "Brickdust" or fatty sediment in the urine. The tongue is clean. Ringing in the ears. Dizziness. The head feels large.—**CHINA.** "After the first paroxysm, the apyrexia will show debility hardly in accordance with the severity of the attack; not full relief of the cephalic congestion, as manifested by noises in the ears, headache with an increased feeling of fulness in the head; sense of constriction from ear to ear over vertex; appetite easily satisfied; and, usually, swollen liver. During the chill, which may not recur at the same hour each day, and is usually short, though it may be violent, there is not much thirst, but the cerebral pressure is marked by nervous sensitiveness and irritability; the hands and feet are very cold; the respiration is hurried, though the lungs do not show much congestion. The hot stage is general and long, but there is not much thirst; the

hands and feet become warm; the veins swell; the patient, still sensitive, is intolerant of covering, and the general condition is one of extreme nervous excitement, the face being red and flushed, and the brain still pressed. Profuse, weakening sweat follows, the thirst now making its appearance to supply the loss; tenderness of the spleen and sleepiness" (E. U. Jones).—

ARSENICUM ALBUM. The stages and the intermission are rarely well defined. The chill is not severe, though usually pronounced; internal shivering and coldness, with external heat. Drinks little at a time, with pain and distress in the stomach and vomiting after drinking; abdomen bloated; anxiety, restlessness, irritability, pronounced prostration. The hot stage may be clear-cut or consist of alternate spells of heat and shivering, or of both at the same time. The constitutional symptoms are severe; there is intense restlessness and anxiety; severe headache, with vertigo; burning in the stomach; tension and pressure in the left hypochondrium; characteristic thirst; dry, red tongue; anxious, oppressed breathing; palpitation of the heart. The sweating appears gradually, possibly not at all; it may be copious and protracted; but it does not materially relieve the patient. During the apyrexia the patient presents pallor and sunken appearance of the face; great prostration, irritability, despondency; characteristic gastric symptoms, with loss or perversion of taste, distress after eating, fetid, watery diarrhœa, sometimes dark; scanty, turbid urine; pale, dry, cold skin; at times cold, clammy perspiration, œdema of the feet, and all the way through a sensation of great weakness. "Tertian fevers, such as are caught on the seashore."—

NATRUM MURIATICUM. "The general symptoms of the patient show cachexia. He is dejected, apprehensive of the future; easily chilled, and takes cold easily; comparatively emaciated; of a sallow complexion; feeble heart-action, and consequently easily excited and sometimes intermittent pulse. The apyrexia is characterized by debility, is imperfect; aching in the liver; tenderness of the spleen and increase of turbid urine, with deposits of urates; sallowness of the complexion. It may last from twelve to thirty-six hours, but the attack is usually quotidian. During the pyrexia there is almost constant headache; the chilliness commences near noon (11 o'clock, as has been constantly verified by my own experience), and is not entirely ab-

sent through the succeeding stages, as is the thirst, which commences with the chill; vomiting, with bitter taste in the mouth; even cold water is quickly ejected. The hot stage is moderate, and is not always free from a suspicion of chilliness; the headache, which seems to have connection with the disorders of the nutritive system, increases; the oscillations of sensational temperature give greater palpitation of the heart; 'blisters form on the lips like pearls.' The sweat varies in its force and duration, but generally relieves the headache and bone-pains.' (E. U. Jones.)

REMITTENT FEVER.

A form of malarial fever which is characterized by continuous elevation of the temperature above normal, with marked remissions and usually symptoms of gastro-intestinal irritation.

The *structural* changes noted, post mortem, are largely those of severe intermittent fever. The spleen, at first, becomes hyperæmic and swollen, then permanently enlarged, remaining soft; the liver is hyperæmic, and in cases of long standing may become atrophic. Extensive pigmentation, also seen in other severe forms of malarial infection, constitutes one of the most striking changes peculiar to remittent fever. The organs involved have a dark appearance, in protracted cases resembling bronze; sometimes the color is grayish or bluish-black. This pigmentation has been seen in the spleen, liver, brain and marrow of long bones; other highly vascular organs, as the kidneys, pancreas, thyroid gland, and even the skin, may be found more or less pigmented.

Clinical History.—In some cases a prodromal stage is noted, consisting of malaise, headache, shivering, possibly vaguely defined paroxysms. More often the onset of the disease is marked by a chill, followed by high fever. In many cases the gastric symptoms are pronounced, the patient suffering early from furred tongue, prolonged nausea and vomiting, epigastric tenderness, often watery diarrhoea, and a state of intense "biliousness," at times with copious vomiting of bile; jaundice also may be present.

During the fever which follows the chill, the temperature rises to 102° to 106° F.; the pulse is full, bounding, in exceptional cases dicrotic; the face flushes; there may be considerable in-

volvement of the nervous system, even to delirium. The fever here continues much longer than does the hot stage of the intermittent, and ten, twelve, even twenty-four hours, may elapse before it passes off. A slight sweat usually follows, with much relief, marking the beginning of the remission, which commonly takes place at midnight or during the hours of early morning. The temperature, however, remains from 2 to 4 degrees above normal until the appearance of the next paroxysm, when it again rises.

The paroxysms recur much after the manner of the intermittent fever, corresponding to its types. In the average case they become lighter after the first week, and subside by gradually decreasing in severity or by assuming a distinctly intermittent type, or by crisis. The average case runs from two to three weeks; recovery sometimes takes place in a week.

Again, the case may be greatly protracted by the development of symptoms of great depression of the nervous system, giving rise to a state which resembles typhoid fever; this resemblance often is great, and the haggard, worn, anxious look, pallor of the face, dryness of the tongue, muttering delirium, enlargement and tenderness of the spleen which are present in both these diseases, both preferably appearing in the same time of the year—the months of autumn—may render a differential diagnosis very difficult. In fact, bacteriological tests may alone be able to settle the diagnosis.

The prognosis is more serious than that of intermittent fever, but in uncomplicated cases it is favorable. Anaemia, dropsy, or permanent enlargement of the spleen frequently follow.

Treatment.—The most important remedies are: BAPTISIA, BRYONIA, GELSEMIUM, RHUS, ARSENIC, MERCURIUS, IRIS, PODOPHYLLUM, LEPTANDRA, and NUX VOMICA. The remedies considered under Intermittent Fever and under Typhoid Fever may also be consulted.

BAPTISIA is by all means the remedy which most frequently cuts short the course of this disease. It has dull, frontal headache, sometimes oppressive and stupefying; gastric and abdominal uneasiness and pain, involving also the liver; rumbling in the bowels; thick, yellow coating of the tongue; bad, flat taste in the mouth; fetor of breath; diarrhoea of mushy stools; general muscular soreness, bruised sensation all over.

Face looks dark, besotted; there is mental confusion, a half-dazed state, with low muttering delirium.—*BRYONIA* ranks next. Under it the gastric irritation is greater; there is more constant, aggressive vomiting, frequently of a bilious character. The chill is accompanied and followed by violent throbbing, bursting frontal or occipital headache, sharp stitches in the spleen, bronchitis, with great soreness when coughing, and great thirst during the fever, which has burning, intense internal heat. Delirium during the night. Dislikes to be touched or moved.—*GELSEMIUM* is useful in the early stage (see "Intermittent"). It has made a good record in the treatment of all the malarial fevers of children. The muscular weakness is especially pronounced, with great restlessness; duskiess of the face; dizziness; indifference.—*RHUS* and *ARSENIC* come into play when the symptoms resemble those of typhoid fever. *RHUS* has a red triangle at the tip of the tongue, great weakness, with trembling of the hands, dry brown tongue; pain in the back and legs.—*ARSENICUM*: profound adynamia; the remissions are well-marked; characteristic thirst; much distension and heat of the abdomen, with rumbling in the bowels and dark, fetid diarrhœa; diarrhœa of putrid, undigested stools.—*MERCURIUS* frequently covers the hepatic symptoms; tenderness and soreness in the liver; jaundice; dark and offensive urine.—*IRIS* has much gastro-intestinal irritation, with violent and exhausting vomiting of copious and intensely sour water mixed with yellow, green bile.—*PODOPHYLLUM* acts especially well in children, when there is tendency to bilious diarrhœa, loss of appetite, belching of sour, hot flatus; everything taken into the stomach, drink or food, turns sour.—*LEPTANDRA* and *NUX VOM.* prove serviceable when their well-known indications are present.—*EUPATORIUM PERFOL.* (see "Intermittent") in doses of from five to ten drops of the tincture, every one to two hours, is advised by Hale.

CHININUM ARS. and *QUININE.*—"There is a tendency in a remittent, ending on the seventh or fourteenth day, to recur in seven or fourteen days after. Here quinine is indicated; two grains three times a day, or the arsenite of quinine, a grain of the first decimal three times a day, until the critical day has passed" (E. M. Hale).

PERNICIOUS MALARIAL FEVER.

This form, as indicated by its name, is always serious. It is found in persons who from previous attacks of malarial fever or some other disease are much exhausted or into whose system an unusually large amount of the malarial poison has been received. The "pernicious" quality of the fever is said never to show itself in a first attack of malarial infection, but in the second or third attack. It is of rare occurrence in temperate climates, but comparatively frequent in the South.

The various types of pernicious malaria depend upon the prominence of special symptoms; those most frequently recognized are the *bilious*, *algid*, *asthenic*, *comatose* and *hæmorrhagic*.

The bilious form. Symptoms of "biliousness," as coated tongue, foul breath, loss of appetite and constipation, may precede the attack; muscular soreness and pain are often present. General irritability of the nervous system, peevishness, and frontal headache may be noted, especially among persons who have had previous attacks. The muscular pain is hardest in the loins and knees, is accompanied with much soreness, and may be very great; in severe cases neuralgia of the large nerves (as the sciatic) and cramps in the calves of the legs may occur. If the first symptom is a chill, it may be very severe, and violent vomiting will probably be present. During the *fever* the pulse is rapid, the heart's action irritable, the face deeply congested, and the eyes staring, glistening. The temperature runs high, up to 105° , or higher. Vomiting is persistent, copious, bilious. There is much tenderness in the epigastric, hepatic and splenic region, with great loss of flesh and strength. In the rapid progress of this form marked prostration and anæmia develop; the bowels, from loss of strength of the intestinal muscular fibre, become stubbornly constipated; pronounced jaundice in some cases develops early and rapidly; the urine is dark, of high specific gravity, and contains an excess of urates and phosphates, in severe cases bile pigment and blood.

Occasionally, diarrhœa is noted, with dysenteric or choleraic stools. The hot stage is by all means the most pronounced; the cold stage and that of sweating may be very light or absent.

The algid form closely resembles cholera, and is very often fatal. There is active vomiting and purging; intense thirst, feeble, small pulse; hurried breathing; coldness of the body; huskiness of voice; cramps; scanty or suppressed urine; utter prostration; collapse. External coldness of the body may exist with high internal temperature. Death usually occurs from asthenia.

The asthenic or adynamic form is marked by early and profound prostration of the nervous system, with feeble and irregular action of the heart and pulse; the sweating is very copious and exhausting; here, also, death occurs from asthenia.

The comatose form is a disease of tropical countries; when seen in temperate climates it is usually found in localities where the malarial miasma is concentrated and in persons who, residing in such localities, have neglected proper care and treatment of repeatedly occurring attacks of malarial fever. The clinical history is one of early profound coma, with death in collapse, or of violent delirium with evidence of intense cerebral congestion. In the former, death is due to general toxæmia; in the latter, cerebral hyperæmia and œdema are found *post mortem*.

The hæmorrhagic (hæmaturic) form, also, is very dangerous: It begins with prolonged chill and rigors, followed by a rapidly rising temperature; there is restlessness and anxiety on part of the patient; scantiness of urine, which soon is loaded with blood-discs, bile pigments, albumin, and granular and blood casts. Hæmorrhage from the mucous membrane (nose, mouth, stomach, vagina, rectum) appears, with, often, intense hæmatogenous jaundice, the skin in some cases assuming a bronze color. The constitutional symptoms, as vomiting and headache, high fever, dry, hot skin, etc., continue. If the case is severe, delirium, coma, Cheyne-Stokes respiration, and death supervene.

So long as the mind remains clear, the outlook continues favorable; the development of delirium or coma renders the case critical. The hæmorrhages, according to Thompson, "usually bear a direct relation to the intensity of the chill, which favors internal congestion." Death is due to toxæmia or asthenia.

Diagnosis.—Pernicious malarial fever resembles typhoid

fever, yellow fever, cholera; also, ulcerative endocarditis and pyæmia, uræmia and meningitis. *Typhoid fever* has rose-colored rash, epistaxis, tympanitis, characteristic (pea-soup) stools, relatively slow onset, characteristic temperature curve, more continuously sustained fever, and characteristic tongue; the nervous symptoms (as subsultus, ataxic symptoms, etc.), are also more pronounced. In malarial fever the tongue is larger, flabby, with thicker, heavier coating; greater intensity of the gastric and bilious symptoms, with persistent jaundice. "Aggressiveness" of the symptoms. During the paroxysm "the face is more flushed, the eyes are congested, and the expression is more animated than in typhoid fever." The history of previous paroxysms and of exposure to malarial influences must be taken into consideration. *Yellow fever* is more quickly fatal, selects newcomers, has black vomit; jaundice appears later. Pernicious malarial fever is less quickly fatal, selects its victims among those who are old residents in malaria-infected districts, has no black vomit, has firmer pulse and higher temperature, and has jaundice earlier. *Cholera* is chiefly recognized by the presence of an epidemic, the clearness of its ætiological factors, and the presence of specific micro-organisms. The occasional appearance of dysenteric, bloody stools in the algid form of pernicious malarial fever must be remembered. *Ulcerative endocarditis* may be approximately determined by physical examination of the heart and by establishing the existence of embolic infarctions; in *pyæmia* a source of septic infection can usually be determined. These signs are absent in malarial poisoning. In *uræmia* and *meningitis* the coma appears later than in malarial fever; it is preceded by photophobia and delirium, and there is a low temperature.

Treatment.—The dominant school insist upon the immediate use, hypodermically, of fifteen-grain doses of one of the soluble SALTS OF QUININE, as the HYDROCHLORATE, combined with one grain of SODIUM CHLORIDE. OPIUM, MORPHINE, ATROPINE, STRYCHNINE and heart stimulants are used as indicated, upon the basis that "everything depends upon tiding the patient over a present paroxysm and preventing the recurrence of the second, which is so apt to be fatal." Warburg's TINCTURE OF OPIUM is used to control the vomiting and purging.

The absolute necessity of using stimulants promptly and

energetically by mouth, rectum, and hypodermically, according to the necessities of each case, is too evident to be discussed; it includes the use of hot bottles to the feet, friction, etc. Feeding must be generous to the extent of the patient's ability to digest, at least as soon as improvement shows itself. Common-sense suggests the superior advantages of highly concentrated food in fluid form (egg-albumen in wine, preferably sherry; beef-juice, and special beef-preparations), given in small but increasing amounts every two hours.

As to the use of quinine in the pernicious type of malarial fever, and the dose in which it should be given, great differences of opinion exist among writers of the homœopathic school. In the main, there is an agreement that its chief value lies in its power to prevent a repetition of the paroxysm, and that doses of one to three grains, administered every few hours after the paroxysm has subsided, better answer the legitimate uses of the drug than do large doses; the wisdom of using it hypodermically, if at all, is generally admitted. In the meantime, the remedy indicated by the symptoms of the individual case must accomplish the cure, and, in view of the extreme urgency of the case, may also be administered advantageously by the hypodermic syringe.

The *bilious* type suggests ACONITE, BRYONIA, CROTALUS, PODOPHYLLUM, MERCURY. The *algid* form demands CAMPHORA, VERATRUM ALBUM, possibly PODOPHYLLUM. The *adynamic* form requires ARSENIC, CHINA, RHUS. In the *comatose* form OPIUM is preeminently indicated. The symptoms of the *hæmorrhagic* form are covered by CROTALUS, LACHESIS, ARSENIC. BELLA-DONNA, CURARE, PHOSPHORIC ACID and others may be called for by existing symptoms.

MALARIAL CACHEXIA.—CHRONIC MALARIAL POISONING.

The malarial cachexia is the result of gradual and effective saturation of the system with the malarial miasm. It is seen in persons who have had successive attacks of ague neglected or badly managed. To a certain extent an acute paroxysm, though not always without danger, may be looked upon as an explosion which affords protection against the more profound effects resulting from a persistent accumulation of the malarial

poison, slowly but surely undermining the constitution. It is for this reason that many of the victims of chronic malarial poisoning are found among those who have for a long time resided in malarial districts without having experienced any of the acute forms of the fever.

Osler points out that the characteristics of the malarial cachexia are: anæmia and enlarged spleen; these two conditions are always present. Additional minor symptoms occur which have led to the description of "types," such as bilious, gastric, etc.; these possess no clinical value. The appearance of a person suffering from chronic malarial poisoning is that of one thoroughly cachectic. The face is pale, of a dirty yellow, slightly bronzed color; the mental operations are performed slowly; there is depression, emaciation, and loss of physical energy. The hands and feet are cold, the ankles often œdematous, and slight exertion results in breathlessness. Digestion is usually deranged. A "bilious" condition supervenes early; the tongue is large, flabby, thickly coated, with a whitish-yellow coating, and the edges bear the imprint of the teeth; the taste and odor from the mouth are bad, offensive; constipation or diarrhœa are present. The spleen is greatly enlarged, and it is in this form that the "ague-cake" may be distinguished as low as the umbilicus, and even lower. There may be occasional shiverings and irregular paroxysms of fever; neither are pronounced; the temperature usually is low for days, but it may reach 102° or 103° F., and remain there for some time. In severe cases œdema may become general.

The *diagnosis* depends upon a history of long-continued exposure to malarious influences, the presence of anæmia and splenic enlargement, and the demonstration of the "crescentic forms of the malarial germ and of flagellæ in the blood." The *duration* of the disease is indefinite, and the *prognosis* reasonably good, so far as eventual recovery is concerned. It is, however, well to remember that the cachexia itself would prove a serious complication in case of a secondary disease, such as tuberculosis or dysentery.

Treatment—The general treatment must necessarily be tonic in character; good, wholesome food, careful attention to personal hygiene, and promptness in controlling untoward symptoms are of importance; the condition of the bowels should

receive special attention. Permanent removal to a non-malarious country is often imperatively demanded.

The enlargement of the spleen may prove a source of especial anxiety to the patient. Proper constitutional treatment, if it cures the cachexia, will also cure this symptom; however, if the patient worries, an ointment of mercuric biniodide or a belladonna plaster is unobjectionable.

ARSENICUM has become a routine prescription with physicians of all schools. It should only be used when the cachexia is well established, with anæmia, great debility, difficulty of breathing, dropsical tendency, neuralgic affections, and the known keynote of this remedy. "The tongue remains clear, and the pallor makes its appearance early." (Baehr.)—CHININUM ARSEN. is preferred by many practitioners when the hot stage is marked, with full strong pulse during the fever and with inclination to uncover. The IODIDE OF ARSENIC has not been extensively used in malarial cachexia; a careful study of its symptoms leaves the strong impression that it should be given extensive trial.—NATRUM MURIAT., in the higher attenuations, is credited with many cures. Innutrition, great emaciation, prostration, sallowness and dryness of the skin, mental depression and tendency to intermittent pulse are among its characteristics. "Hard chill very often at 10 or 11 o'clock A. M., with great thirst, which continues through all stages. The heat is characterized by the most violent headache, relieved by perspiration. There soon appears an eruption of hydroa or fever blisters, which cover the upper and lower lips like pearls. During the apyrexia: sallow complexion, dry, white coated tongue; bitter taste; water tastes bad; loss of appetite; after eating, sour belching and vomiting; pressure in the stomach; swollen stomach; pain in the region of the kidneys; cutting pain in the urethra after micturition." (Raue.)—FERRUM covers many symptoms of the anæmic state, is recommended in enlargements of the liver and spleen, and has made a good clinical record. There is pallor of the face, which, however, flushes crimson from any slight start, pain, or emotion; chilliness with thirst, vomiting of food, coldness of hands and feet; heat of the entire body, without thirst; exhausting sweat, with little, if any, relief of symptoms. Throughout the apyrexia there is much muscular debility and general exhaustion, somewhat

relieved from moving about; vomiting of undigested food; lenteria; constipation; œdema of hands and feet; anæmic murmurs; hæmorrhagic diathesis. It is said to be useful after the abuse of quinine.—LYCOPodium has marked digestive and bilious disturbances, with great intestinal flatulency, tenderness to pressure in the region of the liver, despondency, oppression of the chest, sour vomiting, copious sour sweating, thirst. Fever from 4 to 8 o'clock P. M.—LACHESIS. Symptoms of malarial poisoning recur every spring, especially after the indiscriminate use of quinine during the preceding autumn, as well as after the abuse of quinine generally. Chill without thirst, commencing in the small of the back, running up to the head, with chattering of teeth, soreness of chest; wants to be held firmly to relieve the pain in the head and chest and to prevent shaking. Heat with thirst; livid complexion; oppression of chest; loquacity; internal sensation of heat while the feet are cold; burning in the palms of the hands and soles of the feet, so he must uncover them. Profuse sweating affords relief.—CALCAREA CARBONICA. One of our best remedies. It is indicated by well-known characteristics, such as: affinity for the scrofulous diathesis; large people of fair complexion, with glandular swellings, and chill with thirst; heat and sweating without thirst; external coldness and internal heat; coldness of single parts; great weakness, showing itself upon slight exertion, very marked when going upstairs.—SULPHUR. History of suppressed rash or eruption, with heat on the top of the head and cold extremities; "red lips; red tips of the tongue; worse after eating; sudden attacks of faintness, with hunger in the forenoon; costiveness, or else looseness of the bowels early in the morning, driving him out of bed; hæmorrhoidal complaint; leucorrhœa; cough when lying down in the evening; feverishness through the night; complete sleeplessness; itching of the skin."—It is stated upon good authority that in the sulphur mines the malarial cachexia is unknown. Fumigations with sulphur are practiced in Africa by elephant hunters as positively prophylactic.—MERCURIUS BINODATUS is recommended by E. U. Jones on account of its close relation to the glandular structure and its action upon the spleen and liver. "Constant chilliness, or chilliness with alternations of heat, followed by easy and copious perspiration, taking place generally during sleep."

DENGUE-FEVER.—“BREAK-BONE” FEVER.

An acute infectious disease which occurs in tropical and sub-tropical countries, in a territory lying between 32° N. and 22° S. lat., usually appearing in the summer, characterized by fever, severe pains in the bones, joints and muscles, and frequently accompanied with an anomalous eruption of the skin. The contagiousness of the fever is still in doubt. It probably is carried by fomites; it spreads rapidly along the lines of travel by ship or railroad, and as an epidemic invades large territories.—No race, age or sex is exempt.

Symptomatology.—The onset of the disease is sudden. A severe chill, or repeated shiverings along the spine, is followed by fever which, usually moderate, may rise rapidly, even reaching a temperature of 103° to 106° on the evening of the first or second day. There is boring, frontal headache, at times occipito-spinal, with intense, agonizing, boring, “breaking” pains in the bones, joints and muscles, with moist, yellow-coated tongue and high-colored, feverish urine, which may show traces of albumin.—After three or four days the fever rapidly disappears, often by crisis, and an apyrexia sets in which continues from two to four days and is characterized by weariness, soreness and stiffness all over the body and the presence of an anomalous eruption of the skin, which may be macular, diffuse, lichen-like, vesicular or resembling urticaria.—At the expiration of this apyrexia a second paroxysm of fever sets in, with the same aching in bones and limbs which accompanied the initial paroxysm, but less severe; in the course of two or three days the fever again falls, the temperature occasionally becoming subnormal, the eruption fades, desquamation takes place, and recovery sets in, commonly seven to nine days after the appearance of the first symptoms of the disease.

The temperature in moderate cases does not rise above 103° , the pulse reaching 110 to 115 beats per minute; exceptionally the former may reach 106° to 107° , the latter 120 to 130. In many cases the fever is remittent, with evening exacerbations. Generally speaking, the pulse in dengue is soft; the temperature, during the remissions, may drop to 95° or 96° . Falligant (Arndt's System) mentions a moist, cool condition of the skin,

with great sensitiveness to cold, and occasionally jaundice; he emphasizes the absence of thirst in dengue as characteristic of the disease.

The pains are properly described as "bone-breaking;" they are very severe, often shifting, and not infrequently associated with cutaneous hyperæsthesia. The joints are often swollen and red, resembling rheumatism.

The gastro-intestinal symptoms may be sufficiently pronounced to constitute a distinct type of the disease, characterized by severe vomiting and purging, with great general exhaustion and, often, much weakness and irritability of the nervous system. Again, there may be a hæmorrhagic tendency with moderate bleeding from the gums, nose, lungs, stomach, kidneys, bowels or uterus. Great restlessness and insomnia, only in part due to the general soreness of the body, are present in some cases.

Enlargement of the lymphatics is frequent and may persist for weeks after the cessation of the fever.

Convalescence is tedious; it is characterized by remarkable and long-continued prostration of body and mind. Relapses are frequent.

Complications are rare. The *sequelæ* are unimportant, consisting of neuralgic pains, stubborn mental depression and successive crops of boils. The *prognosis* is favorable, death rarely occurring.

Diagnosis.—The nature of the pain, especially when the articulations are severely affected, suggests rheumatism; but the character and the course of the fever, the absence of acid sweating and of cardiac complications, as well as the anomalous eruption of dengue-fever, establish the diagnosis.

"*La Grippe*" resembles dengue-fever in the rapidity with which it invades large territories and attacks entire populations; also in the suddenness of the onset, the great prostration accompanying it, the frequency of relapse, severity of the pain, and the small mortality caused by it. But the grip differs in the entire absence of geographical restriction, the character of its fever, the absence of arthritic involvement, and chiefly in the seriousness of its complications and sequelæ.

Treatment.—During the chill, artificial warmth, heavy bed-covering, hot foot-baths (mustard) and hot drink are recom-

mended; during the fever, if there is thirst, cool drinks are allowable; sponging in hot water-and-alcohol affords comfort if there is much sweating, and, with gentle rubbing, will relieve the soreness of the body. Light stimulants (hot brandy-toddy) will prove acceptable when there is much prostration.

As to internal medication, Falligant recommends ACONITE and BRYONIA in the first stage; IPECACUANHA to control vomiting and ARSENIC for the diarrhœa.—BRYONIA and RHUS when the fever is obstinate and when eruption is present.—COLOCYNTHIS and NUX VOMICA for gastric disturbances.—MERCURIUS SOL., CHINA, NUX VOM., for jaundice.—In hæmorrhagic conditions ACID. SULPHUR., ARSENIC, SECALE, CHINA.—TINCT. FERRI. CHLOR. FORT., in watery solution, every two or three hours, if a hæmorrhagic diathesis is manifested.—CANTHARIDES, BELLADONNA and ARSENIC in renal hæmorrhage.

DIPHTHERIA.

Synonyms: Diphtheritis.—Angina Maligna.—Cynanche Contagiosa.

An acute, infectious and contagious disease, characterized by the appearance of pseudo-membranous deposits upon the mucosa and upon the denuded skin; the exudate contains the Klebs-Loeffler bacillus; the disease is accompanied by constitutional symptoms of varying severity and, in a large number of cases, evidence of specific systemic infection.

Ætiology.—Diphtheria occurs endemically and epidemically. In the centres of population sporadic cases of the disease are almost constantly present; under favorable conditions it may readily become epidemic. It is easily communicated from person to person by means of the pharyngeal excretion and the saliva of the sick; it is doubtful if it is ever transmitted by the breath. Clothing, bedding, linen, toys and pet animals about the house may afford lodgment to the excretion, and thus become effective agents in spreading the malady. Often shreds of the membrane are violently thrown out in the act of coughing and brought into contact with the mucous surface or denuded skin of physician or attendants, thus transmitting the infec-

tion. A kiss upon the lips of a sick child may have the same disastrous effect. The specific poison is exceedingly tenacious. Sevestre states that in a Normandy village, twenty-three years after an epidemic of diphtheria, some of the bodies of those who had died of the disease were exhumed; an epidemic at once broke out, first among those who had opened the graves, then extending to others. The radius of the infection is limited to a few feet.

Season, soil, and occupation have little bearing upon the causation of diphtheria, although the disease is more frequent in the cold months of the year. Bad drainage and other insanitary conditions can be considered only in so far as they may cause catarrhal conditions which, by lessening the integrity of the mucosa, render infection easier. Country villages possessing excellent drainage and good surroundings have in many cases furnished the battle ground for epidemics of frightful severity. Age is undoubtedly an important factor, diphtheria, though not confined to any period of life, being to all intents and purposes a disease of childhood. Children from three to five years of age furnish the larger portion of victims; after fifteen years of age comparative safety is reached. But neither infancy nor old age insure exemption. Important *predisposing* causes are chronic naso-pharyngeal catarrh, chronically enlarged tonsils, and generally unhealthy condition of the oral and pharyngeal mucosa. A diphtheritic tendency or predisposition on part of an individual or family is also recognized.

The relation of the Klebs-Loeffler bacillus to diphtheria is very important. Pseudo-membranous deposits constitute an important objective symptom of the disease, but they are not limited to diphtheria; they occur in other morbid states as well, and then resemble so closely the fibrinous exudate of diphtheria as to defy differentiation save by bacteriological means. The studies of Klebs and Loeffler (1883 and '84) first demonstrated the now universally recognized fact that the presence in the fibrinous exudate of the specific micro-organism named after them is limited to diphtheria. Other micro-organisms are found in the exudates of other diseases as well as in that of diphtheria, but this specific bacillus is peculiar to diphtheria. Inoculation of the mucous membrane with a pure culture of it promptly causes diphtheritic inflammation, followed by char-

acteristic accompaniments and sequels, such as paralysis and typical organic disease. Injection of the toxalbumin obtained from it gives rise to violent systemic infection, accompanied by the specific constitutional manifestations observed in those sick with diphtheria.

The Klebs-Loeffler bacillus is "about as long, but is twice as thick, as that of tuberculosis. It is always rounded at both ends, and is frequently knobbed, to present the appearance of dumb-bells, by which name it is frequently known. It is immobile, shows no spores, has its optimum temperature at body heat, and stains perfectly with alkaline methylene blue. It thrives in most of the culture soils, best in blood serum, and lives dessicated over one hundred days" (Whittaker). It is curved or spindle-shaped, and often is seen in groups. It is found in the outer and middle layer of the false membrane, but not in the deep fibrin layer, subjacent mucosa, blood, or internal organs, remaining always at the site of the local lesion. Its habitat outside of the human body is thought to be surface-soil rich in organic matter. Other bacteria, streptococci and staphylococci, are also found in the exudate, and work serious mischief, giving rise to secondary inflammation and suppuration of the serous surfaces and to the severe, frequently fatal, broncho-pneumonia of diphtheria.

The local action is practically the primary effect of the specific poisonous organism. By contact it causes a necrosis of cells, especially of the superficial epithelium and leucocytes, soon followed by hyaline transformation—coagulation necrosis; thus the membrane or exudate is formed, composed of necrosed epithelium and leucocytes, pus, bacilli, fibrin, and at times red blood cells. More or less necrosis of the underlying mucous membrane and of the submucous tissues may exist, with hyperæmia and tumefaction of adjoining mucous structures. Eventually the fibrinous exudation sloughs off, leaving a clean, smooth mucous surface; if the process was severe, extensive necrosis of the deep layers is seen, and cicatricial tissue formed.

The membrane itself at first appears as a thin, vaguely defined film. Developed, it is of grayish-white color, which grows darker, of a yellowish-brown as the exudate grows older; it is elastic, firm, does not disintegrate when shaken in water, and swells in acetic acid. If it involves the superficial

tissue only, it is easily removed, but is pretty sure to re-form shortly. If the deeper tissues are involved, it is less easily detached, and, stripped off, leaves a raw, bleeding surface. The edges are thin, and during the process of extension the outlines are lost. When resolution takes place, effusion of serum and immigration of leucocytes underneath loosens, first, the edges, which curl upon themselves; with the aid of ulcerative processes complete separation results within a comparatively short time, the membrane sloughing off in flakes or in one piece. In some cases the membrane softens, and breaks down into an offensive dark, ichorous mass.

The constitutional symptoms are the result of the absorption into the system of the ptomaines or toxines of the Klebs-Loeffler bacilli. Inoculation with attenuated cultures of diphtheritic virus is now practiced to insure immunity against diphtheria or, if too late, to rob the disease of its intensity.

Symptomatology.—The period of incubation is indefinite; it varies from three to fourteen days, or even longer; if the result of accident, as in case of physician or nurse being brought into contact with shreds of membrane, it may not occupy more than from three to five days.

Slight chilliness, moderate fever, malaise, general aching and soreness all over, especially in the back and extremities, elevation of temperature, rarely beyond 103° , and rather rapid, but not full, pulse constitute the first symptoms of which the patient complains. In children, convulsions may usher in the attack. Soon the throat feels uncomfortable and dry, with burning sense of constriction, tenderness, and some difficulty of swallowing. Examination reveals hyperæmia, and later the formation of the pseudo-membrane, at first appearing on the tonsils, especially on the inner surface, as a white, fleecy film, looking much like mucus. There is more or less swelling of the parts and of the cervical glands. By the third day the exudation covers the tonsils, fauces, and uvula; the soft parts are œdematous; there is tenacious, yellowish secretion from the mucous glands, and fetor of breath. The membrane soon involves the posterior pharyngeal walls; from grayish-white, it grows dark and dirty-looking, leaving a raw, bleeding surface if removed, new membrane rapidly forming. The constitutional symptoms are not necessarily severe; the tongue is

badly coated, dirty yellowish; the pulse is rather rapid and light; the temperature does not rise above 102° or 103° ; there is considerable difficulty of swallowing, but rarely enough to alarm patient or attendant. The urine may be normal; more often it shows the presence of albumin. If the disease dips deep into the submucous tissues, which it may do even in moderately severe cases, the deeper connective tissue may be involved, and much soreness of individual glands, with great tenderness to pressure, is experienced. In very severe cases extensive tumefaction and complete obliteration of the outlines of the neck occurs.

In the average light case, without extension of local affection or systemic invasion, the throat begins to improve at the end of the first week, glandular tenderness and enlargement disappear, the exudation is thrown off by the eighth or tenth day, and convalescence is established. Dangerous symptoms may arise from extension of the local disease or from systemic infection.

Extension of the local disease.—Extension may take place into the *nares* or into the *larynx*. It always greatly increases the gravity of the case. If into the nares, where it may occur primarily, there is copious, acrid, and fetid discharge, interference with respiration, and decidedly increased danger of systemic infection, owing to the abundance of lymphatics in the nasal mucous membrane. The process may involve the tear-ducts, conjunctiva, and antra, or by extension through the Eustachian tubes may give rise to otitis media and perforation of the tympanic membrane.

Still more to be dreaded is extension into the *larynx*, the so-called diphtheritic croup, symptomatically identical with membranous croup. The symptoms which indicate this extension—and it may occur when the pharynx is inconsiderably affected—are huskiness of voice, metallic, croupy cough, and rasping, stridulous breathing. The difficulty of breathing often increases with startling rapidity, so that the lower chest is violently drawn in with each inspiratory effort, with depression of the supraclavicular and intercostal spaces. When the membrane extends into the trachea and bronchia, the condition becomes exceedingly dangerous, the more so since it cannot always be recognized during life. Upon auscultation it is in

exceptional cases possible to recognize the existence of this calamitous complication. Occasionally relief is obtained by the expulsion, usually during a violent fit of coughing, of considerable masses of shreds of the membrane or of a complete cast of the affected tubes. Increasing cyanosis and death from asphyxia commonly terminate the case.

Systemic infection.—As a rule, this corresponds to the severity of the disease, although extensive and severe local disease may exist without pronounced systemic infection. Yet, when the exudation is widespread and disorganization of the false membrane occurs, with great fetor, there is always danger of systemic poisoning. In such cases there will be enlargement of the lymphatics, dirty pallor of the countenance, general and rapidly developing cachexia, rapid and feeble pulse, running up to 140, and more, beats per minute, and a dropping of the temperature below normal, in some cases preceded by a short rise. Gangrenous tendency may develop, with extensive sloughing of the tissues of the neck. Again, evidence of systemic infection may be present from an early stage of the disease, and even from the very start the septic poison may overwhelm the vital forces. In such cases there will be early and extreme prostration, weak and rapid pulse, and a high temperature record, sustained for a few days, but gradually and with hourly increasing rapidity dropping to the subnormal. The throat symptoms may or may not be marked; extension of the fibrinous exudation into the nares is rather common.

In cases of septic infection the appearance of an eruption on the skin is not unusual. Observers have noted three forms: an eruption resembling that of scarlet fever, but disappearing more quickly and without desquamation; an eruption not unlike that of purpura hæmorrhagica, seen only in severe cases; and blotches, dark red or dark pink, with sharply defined outlines, disappearing under pressure, to return as quickly, with desquamation, often in successive crops; the latter form warrants a very serious prognosis.

In practice this picture of the disease is modified by the mildness or prominence of special symptoms, the type of the epidemic, and the constitutional peculiarities of the patient. It must be remembered that the mildness of the case does not in itself insure a favorable issue. There may be slight local

trouble, with little, if any, constitutional involvement, and yet, extension into the larynx or the appearance of a broncho-pneumonia may suddenly render the case threatening or hopeless. On the other hand, the local disease may be very extensive and unyielding, but the patient remain free from systemic infection and make a good recovery. Again, the use of the term "chronic type" may be justified by the tardiness of the resolution of the local affection, the membrane forming and reforming, and delaying convalescence for many weeks.

The exudation, instead of first invading the pharyngeal mucosa, may appear on the conjunctiva, external auditory meatus, vagina, vulva, or anus. Or if the skin be denuded, pseudo-membrane may form on the exposed part. Indeed, abraded or wounded surfaces during an epidemic of diphtheria are quite commonly the seat of persistent fibrinous exudation, and women recently delivered become at such times legitimate objects of especial care and apprehension.

Complications and Sequelæ.—Among the minor complications likely to arise at any time, *hæmorrhage* from the *nose* and *throat*, depending upon deep ulceration, is prominent. The *skin* may be the seat of erythema, urticaria, or purpura. Parenchymatous changes in the *heart*, *liver*, *kidneys* and *spleen* occur here as in other forms of infectious disease. *Capillary bronchitis*, with *broncho-pneumonia*, are comparatively infrequent, but exceedingly grave, complications. *Gangrene*, with severe and even fatal hæmorrhage, may be caused by the gangrenous shreds of pseudo-membrane dropping into the bronchi. *Renal* complications are frequent, but usually need not cause anxiety unless large amounts of albumin are present in the urine, with epithelial and blood casts. Dropsy is rare. *Endocarditis*, *pericarditis*, *pleuritis* and *arthritis* occur exceptionally.

Of the *sequels*, *paralysis* is the most important and common. While comparatively rare in very young children, liability to it increases each year. It most frequently shows itself in the second or third week of convalescence, is undoubtedly due to the action of the toxins upon the peripheral nervous system, and has no relation to the mildness or severity of the case. In the greater number of cases it affects the *palate*, causing a peculiar nasal tone of the voice, difficulty of swallowing and of

manipulating food; as in other forms of post-diphtheritic paralysis, there is weakness of the legs and loss of patellar reflex.—When the eye is affected, strabismus and difficulties of accommodation, with nearsightedness, result.—One or both *limbs* are frequently involved, giving rise to a sense of great weakness in the legs, with resulting awkwardness and unsteadiness of gait.—Loss of power of the *heart-muscle* constitutes one of the most serious complications. The heart beat may become abnormally slow, from 30 to 35 beats per minute, or its rate may be increased to 160, or more, per minute; or the two extremes may alternate in the same patient. Heart-failure and fatal syncope, at the height of the disease, is not unusual, and sudden cases of death from this cause may occur during convalescence. Liability to this accident strongly emphasizes the absolute necessity of cautioning a patient against making any sudden or violent exertion.

Post-diphtheritic paralysis appears without prodromata, is characterized by impairment or loss of the knee-jerk, is rarely complete, and usually warrants a favorable prognosis. Struempell states that after diphtheria the patellar reflex is often lost for weeks and months, even in persons who have entirely escaped the nervous disorders.

Diagnosis.—Diphtheria is differentiated from *follicular tonsillitis* by the more definite character of the exudation, the more clearly defined area of mucous membrane involved, the existing lymphadenitis and tumefaction of the parts, albuminous urine, greater prostration, and the epidemic character of the disease. *Epidemic tonsillitis*, or quinsy, at times resembles diphtheria, but the throat symptoms are more acute than those of diphtheria, there is more pain and distress, and greater swelling and dysphagia; the œdema of the soft parts is more pronounced in tonsillitis; there is absence of pseudo-membrane. The course of the disease is more rapid, the actual suffering greater, there is no interference with the patellar reflex, and the prognosis is good. The differentiation between diphtheria and *membranous croup* is difficult. The appearance of the membrane in both is the same, save that the diphtheritic bacillus is not present in croup. In croup, however, the invasion is much more sudden and the symptoms are sufficiently severe in the very beginning to create anxiety, while in diphtheria a more protracted and

well-defined initiatory stage is noted, without, often, violent symptoms. Membranous laryngitis is to all intents and purposes a local disease, without marked constitutional concomitants; diphtheria, while localized, has constitutional symptoms of marked severity. In membranous croup the larynx constitutes the point of invasion; in diphtheria it is the pharynx, and the larynx is involved later by extension; if necrosis occurs, it is superficial in membranous croup, but involves the deep structures in diphtheria; membranous croup is neither epidemic nor contagious; diphtheria is both; the former is a disease of infancy, the latter may occur in adults. The pseudo-membranous sore throat of *scarlatina* appears later than that of diphtheria; it occurs only in exceptionally severe cases of the fever, while in diphtheria it is always present; in scarlet fever the entire upper respiratory tract is involved, in diphtheria first the pharynx, then the larynx; in scarlet fever glandular affections, with suppuration of the ear and induration of the glandular connective tissue, are frequent; in diphtheria suppuration is rare, and the glandular connective tissue becomes œdematous; in *scarlatina* paralysis is rare, and nephritis with dropsy is frequent; in diphtheria paralysis is common, and nephritis is rare and hardly ever associated with anasarca. Other pathognomonic symptoms, as the "strawberry tongue" of *scarlatina* and the loss of knee-jerk in diphtheria will still further clear the diagnosis.

Prognosis.—The prognosis of diphtheria must be guarded, for it presents a mortality rate which runs very high. Authorities of the dominant school place it at 40 to 76 per cent.; there is no question but that under homœopathic medication it is smaller. Yet, it is justly considered one of the most serious diseases with which we have to deal. Over fifty per cent. of all the deaths occur in children of less than five years of age, and about seventy-five per cent. in children of less than ten years old. In hospital practice the disease has proved especially intractable.

It must be remembered that the severity of the local pharyngeal lesion does not constitute the great source of danger; it is the extension into the larynx or nares and the systemic infection which betokens coming trouble. When the diphtheria-poison pervades the system, heart failure, fatal syncope, and

similar grave complications, may at any time terminate life, even though the local disease appear insignificant.

Profound adynamia, extension of the membrane into nose or larynx, extensive suppuration, gangrene, pronounced uræmia, broncho-pneumonia, during the active progress of the disease or during convalescence, are complications which at all times warrant a guarded prognosis.

Treatment.—*Prophylaxis.*—Here, as in all violent infectious diseases, the intelligence and conscientiousness of the health officers is of supreme importance. To them must fall the responsibility of detecting sporadic cases, and of keeping in check and eventually stamping out of existence epidemics of diphtheria, as of small-pox. Hearty and honest coöperation on part of the medical profession will eventually convince the public of the necessity of giving full support to all such efforts. The careful inspection of all places of a public character, especially of schools and churches, of public conveyances, of sewers, outhouses of all kind, etc., is an absolute necessity. Isolation and disinfection should be rigidly enforced, in spite of every effort to circumvent such efforts. Individual dwelling houses and their inmates are not exempt from the enforcement of these precautionary measures.

If a case of diphtheria occurs in a family, such children as have not been exposed should be removed, if possible; if not convenient or too late, they must be quarantined and carefully watched. Since a bad condition of the mucous membrane constitutes a predisposing cause of diphtheria, it is well, even at this late day, to correct, so far as possible, existing catarrhal troubles, and to take especial pains to heal or protect fissures, abrasions and wounds. Pregnant or lying-in women need to be carefully guarded, since the uterus or vulva, after confinement, are readily infected. The nipples of nursing women, if fissured or sore, are to be watched, and the mouth of the nursing is to be kept scrupulously clean to prevent stomatitis or thrush. School-children should not be allowed to re-enter school until all danger has passed of their acting as disease-carriers. A certificate from the health officer or medical attendant should be exacted before re-admission to school is granted, and this certificate should not be furnished until the child is entirely well and all acrid nasal or other discharges have ceased. The

rooms used for the sick and clothing worn by them must be duly disinfected. Funerals should be held speedily and be private.

Care of the patient.—The patient should at once be isolated; if not sure of the diagnosis, it is best to err on the side of safety. This isolation should be absolute; the attendants also should be quarantined. A large, airy, well-ventilated top-room, kept at a temperature of 65° or 70°, will answer best. All furniture not absolutely needed should be removed. Dishes and other needed utensils must be kept in the sick-room or, better, in an adjoining room set apart for the purpose, since by being carried about the house they will almost surely become carriers of the infection. Discharges from the mouth and nose must be received on cloths, which are burnt at once; excreta are received in glazed earthenware which contains sublimate solution (1:5000). No “pets” are tolerated in the room; pains must even be taken to kill flies which readily find their way into the sickroom and from there to other parts of the house. Food, especially milk, must not be allowed to stand in the sickroom. Brushes used in the local treatment are to be kept in sublimate solution; swabs are burnt as soon as used. The child must remain in a recumbent position, and no unnecessary exertion is to be allowed. So important is this rule, on account of unexpected heart failure and syncope, that it is well to use a feeding cup, and to have an attendant within easy reach to assist the patient when he desires to rise or offers to exert himself. Only one patient is allowed in the same room. Disinfection may be maintained by hanging outside the door sheets wet with some disinfectant solution and by medicated vapor sustained by means of a small stove. The following is recommended for this purpose:

℞. Ol. eucalypt.,
 Acid carbol., ʒ vi.
 Spts. terebinth., ʒ vi. M.
 Sig.—One tablespoonful in a pint of water.

The attendants, for their own protection, must make free use of disinfectants, and after handling the patient, especially about the mouth or nares, should wash their hands in corrosive sublimate solution (1:10000). They must take particular

care to avoid having detached membrane come in contact with their face, especially the eyes or hands, when seeing to the needs of the child during paroxysms of gagging or coughing.

Diet.—The feeding of the patient is very important. Solids are usually out of the question; the liquids employed should represent concentrated and easily digested nourishment. Milk, cream, koumyss, ice cream, broths, meat-jellies, chicken broth or jelly, raw egg beaten up in milk, will for a long time maintain the strength of the patient. Feeding per rectum may become a necessity. Proper feeding is so important an item that the physician will do well to give it his particular attention, to direct what is to be fed and how often nourishment is to be given, and to satisfy himself at every visit that his orders are obeyed to the letter.

Stimulants are well borne, as a rule; in many cases they are a necessity. Of these, champagne is the most grateful. Even to an infant a teaspoonful of champagne every two to four hours may be given to advantage. Next in value rank good old whiskey and brandy. Small doses, frequently repeated, are more satisfactory than large doses at longer intervals.

Local Treatment.—It is generally admitted that local measures, judiciously applied, are beneficial. Indeed, if the early destruction of the bacillus is sufficient to prevent systemic infection, every effort should be made to bring about this result. Aside from this, local treatment serves to dissolve the membrane, to allay irritation and, perhaps most important of all, to preserve cleanliness.

In the employment of local treatment it is well to observe the following rules: feed the patient *before*, not after, treatment. Save to the utmost the strength of the patient; to that end avoid being "fussy" and do not allow unnecessary exertion on part of the sick. Under no circumstances use force in attempting the removal of the pseudo-membrane. Be careful to remove every thread loosened; if not removed, it may be swallowed or may enter the larynx and form a new focus of infection. Guard against the sputtering and coughing of the patient, lest you become infected from shreds of membrane violently expelled by the effort. The applications used must be warm and consistently mild.

Pharyngeal Diphtheria.—My own experience in the use of

local applications for the purpose of dissolving the diphtheritic membrane has not been satisfactory. I am strongly of the belief that their use often does much more harm than good, especially if the necessary manipulations are not performed with the utmost gentleness. Many able practitioners, however, stoutly maintain their usefulness. Bichloride of mercury is a favorite application; the following is a standard formula:

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| ℞. Hydrarg. chlor. corrosiv., | 1 part. |
| Acid. tartar., | 5 parts. |
| Aquæ, | 10,000 parts. |

Wipe off the diphtheritic membrane with a wad of cotton; thoroughly swab the bleeding surface with the solution; three to five wads may be required for each side of the throat to remove the entire membrane; repeat every six to twelve hours. When the tonsils are clear, use a large wad or swab over the entire pharynx.

Whittaker prefers the subsulphate of iron. He applies it by means of a cotton-wrapped sound, the end of which is immersed in the undiluted solution and pressed on withdrawal against the neck of the bottle, so that the fluid may not drop into the larynx; the false membrane is touched or the surface painted quickly. He uses one application a day in the ordinary case; two in bad cases. Spraying by means of a hand atomizer, with hard rubber nozzle, and capable of throwing a continuous and fine spray, is frequently advisable.

Peroxide of hydrogen, in ten or fifteen vol. solution, pure or diluted with equal amount of water, and used every four to six hours, has given satisfaction. In children less than three years old not more than one tablespoonful of the undiluted substance should be used; in those from three to ten years of age, twice this amount may be employed safely. The occasional or even alternate use of a spray of corrosive sublimate (1:5000) has been recommended.

Insufflation of sulphur, by means of a tube of small calibre, applying it directly to the membrane, constitutes a milder, but often very effective, local measure. Cameron, before using the sulphur, gargles the throat with:

| | |
|---------------------------------|------------|
| ℞. Potassii chlorate, | ʒ i. |
| Glycerini, | ʒ ii. |
| Aquæ, | ʒ viii. M. |

Goodno claims good success with a trituration of potass. permanganate, one grain to the ounce, applied by insufflation every few hours to throat or nares.

Nasal form.—Cleanliness of the nares is of great importance, on account of the tendency toward extension into those parts and the difficulty of treating them locally. Children whose pharyngeal vault is filled with adenoid growths are especially liable to extension of the exudation into the nares. All local treatment must be applied with gentleness, else more harm than good will result.

The use of chlorate of potassium and glycerine, or borax and glycerine, with the addition of a little carbolic acid, by means of the douche, spray or syringe, is frequently advantageous. Cameron likes the peroxide of hydrogen, but urges that the nozzle of the atomizer be kept exactly in the middle line of the nares, since otherwise it will impinge upon the septum or inferior turbinated bone and cause epistaxis.

A small syringe, with small piece of rubber tubing over the nozzle, insures gentleness and effectiveness of application. The stream must be applied horizontally and gently, the head held well forward, and the child urged to breathe through the mouth. Should pain in the ear follow the operation, the medicine dropper must take the place of the syringe. For purposes of cleanliness alone, use a saturated solution of boric acid or a solution of 1 to 10 minims of carbolic acid to one ounce of lime water.

Laryngeal form.—Keep the air in the room moist by vapor or steam inhalations, which may be medicated. Any good steam atomizer will answer the purpose for adults. In the case of children it is usually necessary to place over their bed or couch a tent, left open on one side, for purposes of ventilation. The steam is introduced by means of a common kettle, left outside the tent; the nozzle is placed within the tent, at a sufficient distance from the patient to prevent the possibility of his being scalded or burnt. A tablespoonful of oil of turpentine may be added to the water, or oil of eucalyptus, not more than 40 to 60 drops every three hours, or carbolic acid; the latter must not be used too persistently, lest it might affect the kidneys.

If the obstruction increases, and breathing becomes more and more embarrassed, relief must be given by intubation or trach-

eotomy; in either case such relief must not be postponed until too late. Stern (Internat. Med. Congress, 1887) advises intubation in preference to tracheotomy when the patient is less than three and a-half years old; in all adults; among poor people, because they cannot afford the expense of the skilled nursing necessary after the tracheotomy; in cases where skilled assistance cannot be had. When there is reason to think that the trachea is filled with membrane, intubation is never indicated. Tracheotomy is advised in children over five years of age, and, compared with intubation, is preferable in patients between three and a-half and five years old.

Cutaneous Diphtheria is rare. The membrane must be removed as far as possible, followed by irrigation with sublimate solution (1:2000), dusting with iodoform, aristol, boraristol, or similar agents, finally dressing with sublimate gauze and proper bandage.

Post-diphtheritic paralysis is usually benefited by the use of the electric current. The sittings must not be too protracted nor the current used too strong. This applies with particular force when operating upon the muscles of the eye; here not more than four to six milliampères should be used, and the sitting should not be longer at first than two minutes, to be gradually extended to five minutes. Place the positive pole on the temple, the negative pole on the lid of the effected eye. Eserine solution, two grains to one ounce, instilled into the eye, is useful in mydriasis.

Therapeutics.—In the early stage: BELLADONNA, MERCURIUS BINIODAT., PHYTOLACCA.

BELLADONNA: Bright redness of the fauces; dryness of the throat; difficulty of swallowing, especially liquids; high, active fever; glowing heat of the skin; cerebral congestion; slight exudation.—**MERCUR. BINIODAT.:** Exudation not very extensive, white, thick, creamy, easily detached; thick, ropy saliva; swallowing of food and drink very painful from the start; feeling of a lump in the throat, with constant hawking and spitting; loss of appetite.—**PHYTOLACCA:** Redness and swelling of the soft palate, tonsils, and roof of the mouth; livid exudation on tonsils and fauces, with hot, constrictive pain in the throat; *pain shoots into the ears when swallowing; very copious and annoying discharge of tenacious, stringy, ropy saliva from the*

mouth; dull, frontal headache; aching in the back and limbs; very offensive breath; weakness and dizziness. The tincture of the freshly gathered green root proved exceedingly valuable during the prevalence of diphtheria in northern Ohio, from 1866 to '69.

In the treatment of the local disease after the early stage has passed, the most useful remedies are: MERCURY, KALI BICHROM., AMMON. CAUSTIC., PHYTOLACCA, NITRIC ACID, CHLORATE OF POTASSIUM, ARUM, IODINE, APIS MELLIF., CANTHARIDES, and SANGUINARIA NITR.

MERCURY: MERCURIUS BINIODAT. is usually adapted to the early stage of the affection, the purely inflammatory symptoms in the throat being the most conspicuous feature of the case, with considerable pain from swallowing. MERC. IODAT. FLAV. covers similar symptoms, but the exudate at first appears in small patches, well defined, which make the posterior wall of the pharynx look as though dotted with many spots of ulceration. After a time these coalesce, but remain soft, thick, yellow, and easily detached. The tongue is yellow, especially at the root; the tip and edges are bright red. There is much nasal obstruction, from scabs rather than from pseudo-membrane; copious flow of ropy saliva; *swelling of the external throat*. The marked glandular enlargement constitutes the chief point of differentiation between it and the red iodide of mercury. MERCURIUS CYANATUS resembles very closely the corrosive sublimate, which, indeed, has made an excellent record. Under it the local inflammatory symptoms are intense; the fauces, pharynx, larynx and nares, and often the entire buccal cavity, are covered with a tough, thick, leathery exudate, varying in color from a dark gray to a foul green or blackish brown. Flow of saliva is incessant, excoriating the lips and chin; the nasal discharges are acrid and copious; fetor of the breath is great; skin hot and dry; tongue parched and dry, sometimes covered with flakes of exudation; the submucous tissues are involved; infiltration of the neck may be pronounced. From the start the violence of the local symptoms arouses fear of eventual systemic infection, the more so since there is great prostration, very light pulse, haggard face, cold extremities, and feeble, irritable action of the heart. In several successive and severe epidemics in Michigan, in which the writer had abundant oppor-

tunity for the study of the disease, no other indicated remedy yielded as satisfactory results, even when systemic infection of the gravest character was present. All these cases, however, were peculiar in the intensity of the local trouble, and the absence of intense local inflammation was soon regarded as a counter-indication.

KALI BICHROMICUM ranks next. Raue's indications are good: "the discharge from the nose is tough and stringy; pain in the left ear on swallowing; swelling of the parotid glands; croupy cough; measles-like eruption; red, raw, shining tongue, or tongue covered with thick, yellow coating; deep-seated ulceration on the fauces; mucus streaked with blood; fetor from the mouth; all symptoms worse after sleep." The exudation is yellowish-white or *yellow, tough, firm, unyielding*, copious, and *extends into larynx and nares*. Swelling of the cervical and submaxillary glands. J. S. Mitchell (Arndt's System) is correct when he says "I am fully convinced that if these remedies (i. e., **MERCURY** and **KALI BICHROM.**), were used early and continued persistently, our cases of diphtheria would much less often progress to the septic form."—**AMMONIUM CAUSTICUM**. White exudate, tending to extension into the larynx; hoarseness, even to aphonia; croupy cough, threatening suffocation; deep redness of the soft tissues of the upper pharynx, fauces and tonsils; painful and difficult swallowing. Great weakness from the beginning, quite out of proportion to the duration of the disease; fretfulness and restlessness; rapid, weak, wiry pulse.—**NITRIC ACID**. Violent fever; hæmorrhagic tendency; great fetor of breath; despondency. The throat looks as though painted or cauterized with silver nitrate. Ulcers in the mouth, very painful; copious and acrid discharges; flow of thick, tough mucus from the corners of the mouth. Thin ulcerations remain after the exudation has disappeared. Splinter-like pain in the throat. High fever.—**CHLORATE OF POTASSIUM**. Very fetid breath; gangrene of the throat; violent pain in the throat; grayish-white and rapidly extending exudation. Mitchell advises beginning with the second decimal trituration, rapidly increasing to teaspoonful-doses, every two or three hours, of a solution of one grain to the ounce of water; if it fails to relieve promptly, discontinue its use.—**ARUM TRIPHYLLUM** Excessively acrid character of the discharges from the mouth and throat,

excoriating the skin wherever they come in contact with it; lips swollen, raw and bleeding from constantly picking them; great fetor of breath; great restlessness; extensive diphtheritic deposits, with ulcerative tendency.—**IODIUM**. Thick, grayish-white exudation, with tendency to involve the larynx; profuse salivation; extensive glandular induration; tenderness about the larynx; difficult breathing; croupy, laryngeal cough; shrillness or hoarseness of the voice. Especially serviceable in dark, scrawny children of scrofulous diathesis.—**APIS MELLIFICA** is useful when there is much œdema of the throat and uvula. Great and early debility; puffiness of the mucous membrane; diphtheritic patches on palate and uvula, of dirty grayish color; urine scanty, albuminous. "In laryngeal diphtheria it will moderate the œdema glottidis which, with the exudation, forms the cause of dyspnœa."—**SANGUINARIA NITRATE**. *Intense burning* in the throat, fauces and tonsils, especially on the right side, which is covered with membranous deposit. Copious, watery discharge from mouth and nares, mildly excoriating. It seems particularly adapted to persons subject to laryngeal catarrh, and in whom the diphtheria is intractable on account of the chronicity rather than the intensity of the symptoms.

Systemic infection occurs much less frequently under the intelligent and persistent use of the indicated remedy than it does under "aggressive" treatment by severe local measures. Of the remedies already mentioned, **MERCURIUS CYANATUS**, **APIS MELLIFICA** and **ARUM TRIPHYLLUM** often may be safely and advantageously continued into and throughout the stage of systemic infection, always provided they are still symptomatically indicated. The remedies most prominent here belong to that class which stands in close relation to septic and typhoid states, i. e., **ARSENICUM**, **RHUS TOXICODENDRON**, **LACHESIS**, and **BAPTISIA**. Their symptomatic indications may be found in the chapter on typhoid fever. Under **ARSENICUM** the exudation is grayish-white, with burning and pricking at the seat of the pseudo-membrane; hæmorrhagic and gangrenous tendency may be well pronounced. Salivation is profuse.—**RHUS** has bloody saliva pouring from the throat; the parotids are swollen; there is sticking pain in the tonsils; the exudation is yellow; the stools may be transparent, jelly-like.—**LACHESIS**: Extreme difficulty of swallowing; lividity of the mucous mem-

brane; exudation white or yellow; aphonia; great weakness from the start; foul stools; difficult and scanty expectoration. Sensitiveness of the neck to touch. The pain in the throat often is insignificant, although the appearance of the parts would seem to indicate severe suffering. He cannot keep the protruded tongue still; it trembles and moves from side to side. The glands of the neck are hard and swollen. Swallowing of liquids more painful than that of solids. Restlessness; he changes position constantly to find relief from hard aching all over the body. Paralysis of the throat and of other parts. Constant low muttering delirium; great cardiac debility; cold, clammy sweat; coldness of the extremities.—BAPTISIA: Foulness of excretions and of secretions. Characteristic symptoms as given under "typhoid fever;" the throat is œdematous, looks foul and forbidding; yet, there is comparatively little acute pain, though swallowing usually is performed with much difficulty.—The MINERAL ACIDS should also be studied as possibly useful. DIGITALIS, CACTUS, AMYL NITRATE, and other cardiac tonics and stimulants must be employed when heart-failure threatens. GELSEMIUM, CAUSTICUM, ARSENICUM, LACHESIS, STRYCHNIA, COCCULUS and PHOSPHORUS are oftenest useful in the various forms of post-diphtheritic paralysis.

Diphtheria-antitoxin.—Behring, Kitasato, Roux and others have demonstrated that the use of the blood serum of animals which have been artificially rendered immune against diphtheria may be successfully used in the treatment of diphtheria affecting the human family. A very large number of carefully made observations in the chief public hospitals of Berlin, Paris, New York, Boston and other large cities seem to prove a remarkable reduction in the mortality rate of diphtheria, even to one-third and one-fourth of the accepted death-rate, in cases treated with diphtheria-antitoxin. It is, however, generally admitted that the treatment, in order to be successful, must be administered early in the disease, in fact during the first or second day after a diagnosis has been made; if not administered until after the third day of the disease, its effects are far less satisfactory. The antitoxin is given hypodermically, in the region of the flank or buttocks or between the shoulder blades, Behring's preparation usually being preferred. The dose is sixty antitoxin units (Behring's preparation No. 1) in the average case at the first

treatment; if the case should be severe or the patient is not seen at once, a dose of one hundred antitoxin units (Behring's preparation No. 2) may be administered; and in exceptionally severe cases one hundred and forty units (Behring's preparation No. 3) may be given. The dose may be repeated if improvement does not follow the first injection.

Improvement shows itself in the amelioration of constitutional symptoms, as fall of temperature and pulse, and in the disappearance of the membrane, a process which usually begins within twenty-four hours after the injection. In some cases such untoward results as erythema, urticaria, albuminuria and, more rarely, local abscesses follow; these are not often serious. For purposes of affording protection against infection, an injection of one hundred to two hundred antitoxin normals may be administered to persons who have been exposed; the dose, according to Behring, may be repeated in eight weeks. Statistics appear to prove the value of diphtheria-antitoxin as an immunizing agent.

SCARLET FEVER.—SCARLATINA.

General Description and Causation.—An acute infectious disease, characterized by a specific exanthem, high fever and sore throat. It is largely a disease of childhood, most frequently attacking children from the second to the tenth year; young infants, as a rule, escape; exceptionally it occurs in adults. It is not confined to any race or country, but is comparatively rare in Asia and Africa and is reported to be unknown in Japan. Sporadic cases are not infrequent, but much oftener scarlet fever occurs in wide-spread epidemics, preferably in the fall, winter, and early spring.

The disease rarely attacks the same person more than once. Exceptions to this rule exist, but reported second attacks commonly are erythematous or septic rashes which closely resemble scarlet fever.

The essential poison of the contagion has not yet been discovered. Presumably it does not develop until the exanthem appears; it is known to be conveyed principally, if not entirely,

by means of the scales of epidermis which form during exfoliation. It clings to furniture, bedding, clothing—in fact to anything capable of affording it lodgment,—and is thus conveyed from person to person by contact. It is not extensively spread in the atmosphere. Water, milk, or any article proceeding from an infected room may become the carrier of the disease; a convalescent may take it to the theatre, church or school, and a letter may carry it to distant parts. Predisposition or susceptibility to it is not as general as to small-pox and measles; it varies greatly in different persons, making it possible for an individual to convey the contagion from a patient to a third person without himself becoming the subject of infection. The specific germ is not affected by cold, but is killed by steam in motion (live steam); if not destroyed, it retains its virulence for years. The existence of an abraded surface or wound favors infection; hence the special liability to it of women during the puerperium. Suckling and pregnancy protect against it.

Examination after death reveals no specific structural changes or internal lesions save such as may be expected from the symptoms of the disease.

Symptomatology.—The period of incubation, varying from two to seven, or more, days, having passed, the symptoms which mark the real onset of the disease are usually sudden in their appearance and violent in character. The child vomits, feels very ill, has fever which arrests attention by its intensity, and soon complains of sore throat. In other cases the onset is more deliberate, consisting of indisposition, slight chill followed by moderate fever, and accompanied with vomiting. Usually, however, the onset is sudden, and in quite young children convulsions may be present early or actually usher in the attack. The fever rises rapidly, and the thermometer may within 24 to 48 hours mark a temperature of 104° , or higher. The face is flushed, and the skin very dry, pungent, burning to touch. The tongue is furred, the mouth parched, and the throat dry and sore. Within 24 or 48 hours a punctated rash appears, first on the lower neck, then on the breast (infraclavicular) and back, scattered, and resting on a “subcuticular flush” wholly hyperæmic in character; it also appears as a vivid, red, punctiform eruption on the oral mucous membrane, showing plainly

on the palate, fauces, and inner cheek. Within two days the rash is fully developed and covers more or less thickly the entire body; it is of a vivid scarlet, in its brightness unlike any other acute exanthem. Though frequently uniform, there are many cases where the eruption appears in patches, divided by normal skin, thus presenting a mottled appearance. In others, a tendency to papular elevations and roughness is noted; or small miliary vesicles (*scarlatina miliaris*), resting on a deep-red background, cover the surface of the body; or there may be petechiæ, numerous, of considerable size, and constituting one of the pathognomonic features of the malignant type. In some cases the eruption is very light or entirely absent. The characteristic feature of the eruption depends upon the marked hyperæmia which instantly disappears from pressure, but returns quickly; thus, with finger or pencil it is possible to trace upon the scarlet surface of the body, especially upon the back, a sign, name or figure, whose whiteness strangely contrasts with the bright scarlet background. A similar contrast is often seen on the face, the lips and chin being pallid while the rest of the face is fairly ablaze. During the development of the eruption there is frequently much itching, but it is not excessively annoying at any time, and quite rarely so when the rash is fully out; more discomfort is felt in cases where there is much swelling of the skin, the parts then feeling tense and uncomfortable.

The fever in the meantime continues high, without dropping of the temperature with the appearance of the rash; it is accompanied with a pulse varying from 120 to 150, or even higher, and rapid, superficial respiration. The tongue, coated and dry from the first, has assumed the "strawberry" appearance, due to swollen papillæ, which as bright red spots dot the thickly-coated, white tongue; the tip and edges of the tongue are of a bright red. The breath is heavy, and there is frequently a sweetish, nauseating odor from the mouth. The urine is dark, scanty, slightly albuminous. The angina, of varying degrees of intensity, almost always causes much pain and annoyance. Vomiting usually ceases after two days, and food is then relished. The nervous symptoms, which may be very severe during the first two days, grow lighter as the rash fully develops.

Within two or three days after its appearance, the eruption begins to fade, and passes away in the order of its development; the skin roughens, the upper layers begin to separate, first on the neck and chest, and finally desquamation occurs in large flakes (*lamellæ*), the little patient during convalescence often finding much amusement from peeling off large strips of "dead" skin. This process lasts from ten to fifteen days, and may not be completed for three or four weeks. In favorable cases the general symptoms improve during the early part of the stage of desquamation; the fever at first shows marked morning remissions and then passes away by lysis.

The throat symptoms deserve especial attention because of their pathognomonic importance and their bearing upon the prognosis. The pharynx is almost always affected. In very light cases there may be only redness and swelling of the soft tissues, with dryness and some pain in swallowing. In others, somewhat more serious, the parenchyma is involved, with much swelling and possibly the formation of small abscesses in the lacunæ of the tonsils and ulceration; the latter may prove very annoying, owing to free bleeding from necrosed surfaces and occasionally circumscribed gangrene of the tonsils; enlargement of the cervical lymph glands is frequent in this type. The most important and most threatening form of laryngeal affections, however, is *scarlatinal diphtheria*, a diphtheritic inflammation of the tonsils and soft palate which appears on the third, fourth or fifth day of the disease. It presents the usual clinical history of dirty-colored, whitish spots, dotting the inflamed mucous membrane, gradually increasing in size, and terminating in dry necrosis and ulceration. Extension of this process into the middle ear, nose and entire oral cavity greatly intensifies the pain and clinical importance of this form of diphtheritis. In addition, the cervical lymph glands swell enormously; infiltration and œdema extend deep into the connective tissue, and in severe cases there is a thick, firm, "brawny" induration of the entire neck and floor of the buccal cavity. This type of angina is a common feature of some epidemics and may well excite apprehension, since it is associated, not only with severe pain in the throat, but with high fever, severe constitutional symptoms, rapid exhaustion of strength, and such dangerous complications as œdema glottidis.

Varieties.—The following forms may be recognized:

1. Abortive form. All the symptoms are mild. Usually lamellar desquamation; sometimes subsequent nephritis. 2. Fulminant form. Patient dies from the intensity of the intoxication before the eruption appears. 3. Anginose form. The throat symptoms predominate. 4. Malignant form. Typhoid state. Hæmorrhagic tendency. Collapse.

While all cases of scarlet fever present the same pathognomonic symptoms, there is yet great variety of expression in different individuals. In some cases the attack is exceedingly mild, while in the same family a brother or sister, as the result of the same exposure, may die within a few days, "individual susceptibility" to the disease determining the issue. The light cases may present the typical picture of the fever, but there may be no rash (*scarlatina sine eruptione*) and all the symptoms may be trivial in character. It is, however, necessary to realize that the absence of severe symptoms is no guarantee of a speedy or perfect recovery; on the contrary, every experienced practitioner knows that these light cases not infrequently develop complications of the most serious nature.

The so-called *malignant* form of scarlet fever is characterized by great severity of the throat symptoms, by hæmorrhagic tendency, and by intensity of the nervous symptoms. The throat symptoms have already been sufficiently described. Emphasis is to be placed upon the profound constitutional depression which usually accompanies them. They may appear quite early, may develop with startling rapidity, and may result fatally from acute blood-poisoning, from hæmorrhage (as rupture in the coats of the carotid artery from separation of deep slough about the tonsils), from the formation of extensive abscesses, and from sheer exhaustion of the vital forces. The *hæmorrhagic* form is found in feeble children, badly nourished and of slight powers of resistance. The skin usually is extensively involved, and epistaxis and hæmaturia are persistent and copious. Death takes place in two or three days. The *ataxic* or *fulminant* form presents the most perfect illustration of the destructive power of the specific poison. From the beginning the fever is very high (107° to 108° , or higher); there is intense headache, extreme restlessness, delirium, and coma. Convulsions commonly occur. Death takes place soon, often

within 24 to 36 hours from the appearance of the first symptom.

Complications and Sequelæ.—*Nephritis* ranks highest in importance among the complications which may arise. Slight albuminuria, with a few tube casts and very rarely blood, is of common occurrence early in the disease, and has no special significance. The true *scarlatinal nephritis* does not develop, save in exceptional and rapidly fatal cases, until the end of the second or in the third week. It is generally preceded by, and for a day or two accompanied with, an increase of fever, sometimes as high as 104° , with puffiness of the face and eyelids, œdema of trunk and extremities, in severe cases anasarca and even effusions into the serous sacs, more especially hydrothorax. The urine exhibits characteristic changes; the amount secreted is scanty, and anuria may persist for many days. If the case is severe, a specific gravity of 1015 to 1025 is reached; large amounts of albumin are present, and the microscope shows red and white blood corpuscles, hyaline casts, renal epithelium, granules of hæmatoidin, etc.

The duration of scarlatinal nephritis varies. In favorable cases it runs a course of from two or three to five, or more, weeks; sometimes, but rarely, it becomes chronic. Death occurs in the severest form from acute uræmia; in less aggressive cases dyspnœa (from ascites, hydrothorax, or pneumonia), or uræmic accidents, as cardiac failure, are responsible for the fatal issue; œdema of the glottis is a rare, but usually fatal, complication.

The fact that this serious complication may arise during a light case necessitates frequent and accurate examinations of the urine, especially during convalescence. It is justly affirmed that the earlier in the case severe renal symptoms appear, the more serious the prognosis. The exhibition of remedies like APIUM VIRUS, ARSENIC, and others, often yields most satisfactory results.

Affections of the *serous membranes* give rise to grave complications. Here belong *meningitis* (in the early stage), *pleuritis* (with a pronounced tendency to become purulent, often occurring in connection with pneumonia), *pericarditis* (frequently overlooked), *endocarditis* (recognized chiefly by its valvular lesions), and *scarlatinal synovitis* or *arthritis*, usually

appearing during the subsidence of the fever, commonly attacking one joint and strongly tending toward suppuration.

Pneumonia of the lobular form is a common complication of scarlet fever, especially when there is nephritis; it is of importance chiefly because its presence embarrasses respiration.

Ear-complications are very frequent; they often result in deafness, as shown by statistics from Asylums for the Deaf and Dumb. They are caused by extension of the inflammation in the throat through the Eustachian tube into the middle ear, followed by suppuration and perforation of the ear-drum. Further extension may lead to meningitis and brain abscess; or to paralysis of the facial nerve; or to disease of the mastoid bone.

Intestinal disturbances (as diarrhœa and, rarely, dysentery) and *enlargement* of the *spleen* and *liver*, are common. Other complications and sequelæ are: chronic *enlargement* and *hardening* of the *submaxillary lymph-glands*, paralysis, and, more rarely, *melancholia*, *mania*, *diseases of the eye*, *gangrene*, and *noma*.

Diagnosis.—The most important considerations in the diagnosis of scarlet fever are: its sudden onset and intensity; the early vomiting; the early appearance and the nature of the eruption; the continuance of the fever after the appearance of the rash; the strawberry tongue; the early appearance and constancy of the throat symptoms; the lamellated character of the desquamation; the frequent occurrence of nephritis and of ear-symptoms; the existence of other cases in the community; the absence of a previous attack.

Diphtheria.—In diphtheria the membrane appears early and is a constant symptom of the disease; it has a tendency to extend into the larynx; involvement of cervical glands and of the ear are infrequent; nephritis is rare; post-diphtheritic paralysis common. It is now held by bacteriologists that the specific cause of diphtheria has been ascertained; hence, in all doubtful cases, especially when the existence of an erythematous rash confuses the diagnosis, a bacteriological examination should be had.

Acute Exfoliating Dermatitis has: absence of scarlatinal throat symptoms. Involvement of hair and nails during desquamation. Recurrence of the attack.

Measles: Longer period of incubation; catarrhal symptoms precede the eruption; less violent onset; later appearance of the eruption (four days); character of the eruption (dark red, in patches, disappearing four days after breaking out); bran-like desquamation.

Roetheln: Mild character and short course of the disease; mildness or absence of stage of invasion; usually the rash is darker than that of scarlet fever; there is catarrh of the nose and eyes, and only slightly sore throat.

Septicæmia and Pyæmia: Absence of the scarlatinal angina; repetition of the chills; fitful temperature; greater enlargement of liver and spleen; protracted course; metastatic processes.

Prognosis—The prognosis must be guarded, especially among the poor. The issue depends largely upon the nature of complications which may arise, the powers of resistance on part of the sick, and the care of the patient. In hospital practice and among the poor, the rate of mortality in mild epidemics is from 5 to 10 per cent.; in severe epidemics it ranges from 20 to 30 per cent.; among the well-to-do it is less. In children less than one year old scarlet fever is extremely fatal. The disease is more frequent from the second to the sixth year, hence that age figures conspicuously in the mortality tables. As stated, early and severe nephritis, inflammation of the heart or of its sac, pleuritis, severe diphtheritic angina, laryngeal obstruction, hæmorrhagic tendency, excessively severe and early nervous symptoms and unusually high fever from the very beginning increase the seriousness of the prognosis.

Treatment.—**Prophylaxis.**—Since Hahnemann's recommendation of minute doses of BELLADONNA as an efficient prophylactic in scarlet fever this drug has been so employed by the profession generally. It is impossible to determine whether those are right who deny prophylactic virtue to all drugs and especially to BELLADONNA or if reliance can be placed upon the earnest assurance of others that by the use of BELLADONNA cases may be aborted or so modified as to prove comparatively mild.

The specific poison of scarlet fever is exceedingly tenacious, but the area of infection is very small, extending only a few feet from the patient. These two facts furnish the key to the only prophylaxis which appears to be of real value, i. e. perfect

isolation of the sick, strict quarantine of all who may become carriers of the infection, and thorough disinfection of the person of the sick, of everything he touches, of the sick room and its contents, and of all who come into contact with either. Intelligent and fearless action on part of Boards of Health, aided by the honest co-operation of medical men and of the public, will greatly lessen the frequency, the spread and the rate of mortality of epidemics of scarlet fever.

As soon as an epidemic appears, or as soon as cases of scarlet fever are reported, those general measures for the protection of the public which are generally outlined by Boards of Health must be enforced. The house must be quarantined and the patient placed in a room removed from the apartments occupied by other occupants of the same house. A room in the top-story of the building is preferable. The removal of unnecessary furniture and of all articles of value which can be spared is obviously necessary. The care of this room is of the utmost importance. Its bare walls and floor, and everything in it, including patient, nurse, utensils, bed clothing, etc., must be constantly and conscientiously treated with disinfectants. Things of small value, as clothes, books, etc., which the patient has handled, should be burned at once. The air in the room should be kept as wholesome as possible by the use of such deodorizers and disinfectants as have been suggested elsewhere, and nothing should be allowed to leave the apartment without being thoroughly disinfected, and then aired for a long time. After the recovery or death of the patient, complete disinfection of the room must be undertaken by competent authority. Sulphur fumigation is more effective when the sulphur is burned over a wet sand-bath or when water is at the same time boiling in the room. The use of chlorine, freshly made by adding sulphuric acid to a mixture of salt and black manganese, is highly recommended. The walls may be rubbed with slices of fresh bread, which, according to bacteriologists, gathers up the microbes; after that, they should be whitewashed or calcimined, and the floors and wood-work thoroughly scrubbed with a solution of corrosive sublimate.

The throat and nares of the patient should be disinfected daily, both for his own comfort and for the safety of others; a spray of peroxide of hydrogen, 1 to 4 for the throat, and 1 to

8 for the nose, is an excellent application. Physicians and nurses must see to it that they do not, by neglect of common measures of prudence, become disease carriers.

The sickroom must be well-ventilated and kept comfortable for the patient; during the fever a temperature of 66° to 68° , and during the stage of desquamation or in case of nephritis of 70° to 73° , will prove suitable. The bedcovering should be light. The patient must be kept in bed for not less than ten or twelve days; he must not leave the room until desquamation has been completed. When allowed to go out, exposure and danger of taking cold must be scrupulously avoided. Cool, rather than cold, water may be drunk freely as the patient desires; bits of ice may be held in the mouth and swallowed. Diet must be nourishing and liquid; milk best answers the purpose, but broths, cocoa and fresh fruit may be used. Jaccoud is emphatic in his declaration that a milk diet prevents nephritis. Ice-cream often is relished and agrees well.

Hydro-therapeutics constitute the now fashionable and effective means of reducing hyperpyrexia. Showering or cold affusion, popular a few years ago, is no longer generally practiced. The following directions will be found sufficient: *Sponging* of the face, forehead, neck and arms, with cold water to which may be added alcohol or vinegar, when the temperature is not above 102° or 103° . The *cold-water bath* may be used when the temperature is high, above 103° , but the pulse is full and strong, though rapid; capillary circulation is active, and the surface of the body of a bright, vivid color (*asthenic* cases); it must be avoided when the pulse is easily compressed, capillary circulation sluggish, and the surface of the body of a livid, dusky hue (*asthenic* cases). If the hyperpyrexia is accompanied with marked nervous involvement, ice-bags, one-third full of ice, may be applied to the head until the temperature is reduced below 103° ; or silk handkerchiefs, every few minutes wrung out of ice-water, to which vinegar or alcohol (1 to 5) can be added, may be used. If the temperature rises to 104° , or higher, the cold cloths may also be applied to the neck. Cold sponging of the extremities may be employed. If still more active measures become necessary, the forearms and hands may be covered with double thickness of sheets wrung out of ice-cold water. This treatment rapidly reduces the temperature, and usually is agreeable to the patient.

In asthenic cases cold may be applied to the head and neck, but not to the extremities; the latter require hot water, with an abundance of friction, to accelerate the flow of blood and to stimulate functional activity. Bits of ice may be held in the mouth and swallowed.

When there is frequent emesis, J. Lewis Smith uses an enema of ice-cold milk with peptonoids, every three hours. Alcoholic stimulants are kindly borne in asthenic cases, especially in the form of milk-punch or wine-whey. Smith calls attention to the safety of large doses of stimulants in scarlet fever and diphtheria, and recommends a teaspoonful of whiskey or brandy every one to two hours for a child of five years. This treatment is counter-indicated by the existence of scarlatinal nephritis.

Therapeutics.—The great variety of symptoms found in scarlet fever and its manifold complications recalls the force of the maxim that in any given disease any one remedy in the entire materia medica may be indicated. In scarlet fever and in diphtheria, more than anywhere else, I have tested the value of close study of symptoms at the earliest manifestation of an epidemic, for the purpose of finding the “epidemic remedy.” Thus, in the severe epidemic of 1868 (northern Ohio) I found *APIS MELLIFICA* curative in a very large majority of cases; in 1872 (in central Michigan) both *ARUM TRIPHYLLUM* and *MERCURIUS CYAN.* did brilliant work throughout. The special usefulness of these remedies in the epidemics cited depended in *APIS* upon the existing tendency to nephritis, in *ARUM* and *MERCURY* upon the prominence and type of the angina.

In the *abortive form* *PULSATILLA*, *ACONITE*, *GELSEMIUM*, *BELLADONNA*, and *MERCURIUS IODATUS* will probably cover the symptoms in a majority of cases. *PULSATILLA* is of very great value when the patient is “upset” rather than ill, complaining of shivering, slight fever without thirst, and stupid headache; inappetency, with slight nausea; pasty tongue; feverishness; tired and sleepy during the day, but restless at night; urine is scanty, with frequent urging; the eruption is scanty.—*BELLADONNA*. The symptoms are more pronounced, the rash is uniform, typical, but mild; fever and headache more violent than under *PULSATILLA*, and symptoms of general congestion, especially in the throat, which is dry and hot, are more pro-

nounced. Winterburn (Arndt's System) verifies Jahr's observation that *BELLADONNA* in the premonitory period delays the appearance of the rash.—*GELSEMIUM*, with much shivering, dull headache, dizziness, stupid and livid appearance of the face, great muscular weariness, especially in the legs; the eruption is smooth.—*ACONITE*: high fever, sharp and rapid pulse, pungency of the skin to touch, dryness of the throat, great restlessness, with constant tumbling about in the bed from side to side.

In the majority of cases, however, the disease will progress and the throat symptoms assume prominence; it is thus that the anginose form is seen more frequently than others. Here *MERCURIUS CYAN.*, *MERC. IODATUS*, *KALI BICHROM.*, *PHYTOLACCA*, *AILANTHUS*, *ARUM*, and *LACHESIS* come into play. Consult also the remedies under Diphtheria.

MERCURIUS CYANATUS: Fetor from the mouth; tough and stringy salivation; painful deglutition; tough membranous deposits on the tonsils and on the pharynx; deep grayish ulcers, discharging foul, greenish-yellow pus. Rattling and whistling in the throat; hoarse cough; dry, hot skin; urine scanty, dark, without sediment. Its keynote is the predominance of the local (throat) over the constitutional symptoms.—*MERCURIUS IODATUS* covers a similar condition, but is preferable (especially the yellow iodide) when there is marked glandular involvement, while the pharyngeal inflammation is less violent than under *MERC. CYANAT.*—*HEPAR* is indicated oftener than it is used. The nasal mucous membrane is involved; stitching pain into the ears, when swallowing; swelling of parotid and maxillary glands. Symptoms indicating extension into the middle ear; threatening nephritis.—*KALI BICHROMICUM*: Tough, dark, firmly adhering membranous deposits, extending into the nostrils, anterior mouth, pharynx and trachea; the parts not involved are intensely deep-red and swollen; expectoration of stringy, ropy, tough mucus. The fauces are covered with deep, offensive ulceration, with isolated patches of exudation; excoriating yellow discharge from the nose; pain in the ears when swallowing; involvement of cervical glands; "measly" eruption; tongue bright-red or covered with a thick, yellow coating.—*PHYTOLACCA*: Tardy, dry, shriveled skin; to the hand it feels like coarse paper; the discharges

from the nostrils are acrid, excoriating; much like those of ARUM; the tongue posteriorly is coated yellow, is fiery-red at the tip, brown on the sides; ash-colored, diphtheritic deposit, with copious salivation, hard swelling of glands, pains into the ears when swallowing, which is difficult. Restlessness, sleeplessness; hands and feet hot, cannot keep them covered.—ARUM TRIPHYLLUM. The acrid, ichorous character of the discharges is one of the most striking and best indications; when from the nose, it excoriates the nostrils and upper lips to a degree which renders the patient extremely uncomfortable; the corners of the mouth are sore, cracked, bleeding; the child “works” at the mouth and lips in spite of the pain and bleeding caused. The tonsils are puffed and swollen, the throat livid, very sore (burning) and putrid; profuse flow of acrid saliva; all the parts are so sore to touch that it is almost impossible to induce the child to open its mouth; redness of the tongue, with large red papillæ on it; swelling of submaxillary and parotid glands. The constitutional symptoms are marked. There is great nervous depression, restlessness, excitability; sleeplessness; continuous fever; head hot; apathy; delirium, at times wild and with a desire to escape. Rash dark, in patches, with much itching; “desquamation a second or third time, in large flakes, especially when the eruption comes out fully” (Lilienthal). Its beneficial action is said to show itself in an increase of urine.—LACHESIS: Under MERCURY, PHYTOLACCA, and KALI the throat symptoms overshadow the constitutional symptoms; under ARUM they are of equal importance; under LACHESIS and AILANTHUS the local symptoms, though severe, are yet insignificant when compared with the gravity of the constitutional manifestations of the disease. LACHESIS has diphtheritic deposits beginning in the left tonsil, spreading to the right; difficulty of swallowing, especially liquids; the throat looks as though it must be excessively painful, yet little complaint is made, because the patient is too ill to mind the throat much, though he quickly shrinks from external pressure; tenacious, sticky saliva; tongue of a dirty yellow at the root, with red papillæ, showing plainly the “strawberry” tongue; “map-tongue;” accumulation of dried mucus in the throat; purplish swelling of the submaxillary and parotid glands; suppuration of these glands, with discharge of thin, excoriating ichor. The

constitutional symptoms are characterized by profound nervous prostration with muttering, loquacious delirium; stupor from which the child is roused with great difficulty and into which it as quickly relapses; it lies as though lifeless; aphonia, aphasia, greatly impaired powers of deglutition; fluids swallowed escape through the nose; trembling of the tongue when protruded; tardy appearance of dark, purplish eruption; ecchymoses; passive, dark hæmorrhage from the nose, mouth, and bowels; scanty, black urine; offensive stools; coldness of the surface of the body, or heat of the trunk of the body with coldness of the extremities.—*AILANTHUS* is an important remedy in the anginose form of scarlatina, but, like *LACHESIS*, covers even more fully the symptoms of profound constitutional depravity and exhaustion. The throat is dark, livid, and swollen; the tonsils are studded with numerous deep, angry ulcers from which exudes a scanty, fetid discharge; the child refuses to swallow; the tongue is dry, parched, cracked; the teeth are covered with sordes; external neck swollen and sensitive; pulse rapid and weak; skin dry and moderately hot; drowsiness drifting into a semiconscious state; the rash is tardy, copious, or scanty, livid, petechial, blistered; asthenia, with very marked sluggish capillary circulation.

Local measures must not be neglected. The patient's condition usually is such as to make gargling difficult or impossible; yet, the direct application of medicinal substances to the diseased surface is imperative; hence the value of the hand atomizer, preferably one with a hard bulbous tip. A solution of peroxide of hydrogen (1:3 or 1:4) is excellent. The same application, though weaker (1:8), *warm*, may be thrown into the nostrils, once in three or four hours. Use small glass syringe, with curved neck and bulbous tip. A solution of salt in warm water (1 drachm to a pint) is also recommended.

If the cervical glands become very troublesome and the inflammation is of a low grade, an ointment of iodide of lead (1 drachm to one ounce of lanoline) is helpful; if the inflammation is intense and suppuration cannot be avoided, use poultices of flax-seed and of slippery elm; the knife, when necessary.

The *malignant* form of scarlet fever demands the exhibition of *AILANTHUS*, *APIUM VIRUS*, *ARSENIC*, *AMMONIUM CARBON.*, *LACHESIS*, *RHUS TOXICOD.*, *BAPTISIA*, and the mineral acids.

Several of these have been discussed under "Typhoid Fever," which consult. To the indications already given for AILANTHUS and LACHESIS nothing is to be added.—RHUS TOXICODENDRON. In cases which show a tendency to a typhoid state. The fever is not excessively high; the eruption is dark, miliary, and the skin rough; tongue red, smooth, later brown and cracked, with red tip; mental operations and speech slow, tardy; delirium mild, drowsy; is always busy trying to do something which he has not the strength to accomplish; eyes appear "swimming, as if drunk." The tonsils are swollen, of dark, mahogany color, covered with tenacious, yellow mucus. Involvement of cervical glands, first left, then right, with suppuration, copious discharge of offensive ichor (Raue: impure, deep cavity, as if one could see into the throat); extensive œdema and cellulitis. Tendency to erysipelatous involvement of the affected parts.—ARSENICUM meets the case at any stage when the vitality of the patient yields and every symptom assumes a serious aspect. This may occur early in the disease, with tardy, insufficient development of the rash; or the rash, later, may suddenly fade and begin to disappear, with aggravation of all the symptoms; or serious complications may arise during convalescence. In either case the typhoid state will be well pronounced, with the ARSENICUM restlessness, desire to be warmly covered, relief of symptoms from warmth, and aggravation from cold in any form, even from cold drink. There are petechiæ and ecchymoses; the throat symptoms are characterized by burning pain and dryness, ulceration and gangrenous tendency. If there are present, additionally, symptoms of nephritis, œdema, dropsy, with scanty emissions of dark colored urine or anuria, ARSENIC is still indicated.—APIUM VIRUS is of value when the typhoid state is well pronounced, but is not so grave as under ARSENIC. The œdematous tendency, especially in the throat, is its most reliable indication; the throat itself is rose-colored, with a feeling as though it had been scalded or as of a bee-sting in it. Sense of fullness and difficulty of swallowing from the œdema. Fever high, eruption smooth, with itching and "stinging" sensation in the skin; tense œdema of the skin; sweating and dryness of the skin alternating with heat and coldness. Tongue dry, red, swollen, glossy. Dyspnœa and restlessness. Scanty emissions of dark-

red urine. The remedy is of the greatest value when effusion has taken place into serous cavities or when "hydrocephaloid" symptoms exist. Under its action I have seen recovery in cases which seemed hopeless, with rolling of the head from side to side, squinting, suppression of urine, piercing shrieks, and coma. Triturations made from lumps of sugar upon which the poison of the bee had previously been deposited proved most satisfactory; an increase in the amount of urine voided was the first indication of improvement.—BAPTISIA has very decided throat symptoms; they are, however, largely the local expression of that "constitutional depravity" which is one of its most reliable indications. It causes diphtheritic inflammation and ulceration in the throat, with great fetor of breath; offensive, stringy saliva; dry, sore tongue; with brown center and bright-red, shining edges; heavy, dull headache, with burning heat in the face; scalding, high-colored urine; profound depression, with characteristic delirium (see "typhoid fever").—ARNICA is indicated in asthenic cases with ecchymosis and hæmorrhagic tendency; the trunk of the body is warm, the extremities cold; cough, with raising of small amounts of blood; frequent flashes of heat; great soreness all over.—AMMONIUM CARBONICUM is suggested by Raue for swelling of the right parotid and of the lymphatic glands of the neck; putrid sore throat; miliary form of eruption. Lilienthal recommends it in the miliary scarlatina of malignant type, with gangrenous putrid ulceration of the tonsils, covered with rapidly decomposing, sticky, offensive muco-pus; upper half of the body covered by eruption, with violent itching; or faintly developed eruption; stertorous breathing; involuntary defecation and urination; threatening paralysis of the brain, with excessive vomiting. Winterburn (Arndt's System) also speaks highly of its use in the malignant form.

The *mineral acids* are to be carefully studied when the prostration of the nervous system is great and the typhoid symptoms are well marked ("typhoid fever"). OPIUM is suggested by severe cerebral symptoms, with sopor, heavy snoring, and vomiting of cerebral origin.

The *fulminant* form demands BELLADONNA, HYOSCYAMUS, ZINCUM, CUPRUM, and CAMPHOR.

BELLADONNA here is indicated by intense cerebral congestion,

with violent convulsions, violent delirium, with attempts to escape, and violence in all the actions of the child. The face is red; the eye-balls congested; the arteries throbbing; the heat of the head greater than that of any other part of the body; the congestion of the throat is intense, though the local symptoms are wholly overshadowed by the nervous symptoms. Or there is extreme pallor of the face, rolling of the head in the pillow, occasional violent screams or low wailing; paralysis of the sphincters; thread-like pulse.—**HYOSCYAMUS** closely resembles **BELLADONNA**, but lacks the intense congestion and the violence of action; the excitement here seems to involve the general nervous system rather than the brain exclusively. The eyes are sparkling, bright, starting; the patient lies in a muttering semi-delirium, has a look as though his mind were "far away;" if roused, he answers incoherently and relapses into unconsciousness before the reply is finished. Breathing is oppressed, rattling; intense constriction of the throat, rendering deglutition difficult, almost impossible; tympanitic distension of the abdomen; paralysis of the sphincters.—**STRAMONIUM**. Convulsive movements confined to single groups of muscles. The right hand is constantly endeavoring to grasp imaginary objects in the air; paralytic trembling of the arms and hands; spasmodic jerkings of the limbs; pale, coppery-red or receding eruption, with intense itching and dry, hot skin; rattling respiration; talks incessantly, laughs, weeps, sings; is frightened at everything; great dryness of the throat, relieved by drinking; paralysis of the sphincters.—**CUPRUM**. In acute hydrocephalus, often from suppression of the eruption. Delirium in which "fear" figures prominently; biting, striking. Violent spasms, with screaming, followed by great prostration; boring the head into the pillow; face purple; hands clenched; foaming at the mouth; spasmodic rolling of eye-balls.—**ZINCUM**, when the action of the poison centers upon the brain. The condition of the child seems almost hopeless. The patient is unconscious and motionless, save incessant twitching of single limbs, especially of the feet; the occiput is very hot, the rest of the head cold and covered with cold, clammy sweat; face pale, anxious, distorted; breathing superficial, but there is no rattling; sudden piercing, hydrocephalic screams; urine scanty, bloody, involuntary; pulse thread-like; surface of the body cold, bluish.—**CAMPHORA** is now

used by all physicians when a quickly acting, powerful medicinal stimulant is needed, and has largely taken the place of the once fashionable musk. Homœopathically it is indicated when there is sudden retrocession of the eruption, with cold skin and complete prostration, "in desperate cases, with rattling in the throat; hot breath; hot forehead; hot perspiration; limbs cold and purple." (Raue.)—Stimulants may be used as indicated, and application of clothes wrung out of hot water, with frequent brisk rubbing of the extremities, must be perseveringly maintained.

TREATMENT OF IMPORTANT COMPLICATIONS.

Affections of the Ear are frequently of sufficient severity and importance to demand the care of an experienced specialist. The general practitioner, however, by careful attention to ear symptoms during the fever can do much toward preventing or lessening the danger of such complications. If there is much pain in the ear, laudanum and sweet oil dropped into it may at first be safe and give relief; or hot water, with a few drops of the tincture of ACONITE, BELLADONNA or LAUDANUM, allowed to flow gently into the outer ear often greatly relieves the suffering; or heat externally applied by bags filled with heated bran, or salt, or hot chamomile flowers or hops, is very comforting. If the pain is intense, it may be necessary to use a 4 per cent solution of cocaine, to which an equal amount of laudanum may be added. If no relief follows, the pain increases, and bulging of the ear drum can be detected, paracentesis must be performed promptly, and repeated when necessary. This operation, though of no magnitude, should be performed by the aurist; the after-treatment consists chiefly of inflation of the ear by the ear-bag. Offensive discharges from the ear require the use of dry boric acid, of which a sufficient amount to cover a nickel may be gently dusted into the ear; by directing the patient to move the head it can be brought into contact with the ear-drum. After careful cleansing of the ear by syringing with warm water (add to a wineglassful of water half a teaspoonful of boric acid) and then drying it, the following may be used three or four times each day: dissolve in one fluid ounce of water two drachms of boric acid and glycerine; instill enough to fill the external ear. (J. Edward Smith.)

During the stage of acute inflammation the remedies indicated by the totality of symptoms will probably cover the local affection and the usefulness of BELLADONNA, PULSATILLA, etc., is readily called to mind. When suppuration has become established, CALCAREA CARBONICA, HEPAR, SILICA, or SULPHUR must be prescribed.—CALCAREA is especially useful in persons of a strumous diathesis, easily exhausted from physical or mental effort, predisposed to impairment of nutrition, with a tendency to glandular enlargements, sensitiveness to cold air, habitual dampness of stockings from moisture of the feet, and aggravations from washing or bathing. Fat children who suffer from itching of the scalp, are inordinately fond of eggs, are “pot-bellied,” and have sour taste, sour vomiting, sour diarrhoea, are good calcarea-subjects.—HEPAR is indicated by excessive soreness to touch of the affected part; the child cannot, or from oversensitiveness will not, endure touch of the inflamed parts, objecting even to the most carefully conducted dressing; mental depression, weakness of memory, “hasty speech,” sensitiveness to cold air.—SILICA, after suppuration has taken place, does much toward preventing its downward, destructive tendency. Thin, watery, ichorous pus of foul odor; the pus is mixed with blood or little particles looking like cheese; fistulous openings; rawness and soreness of the feet from constant copious sweating; aggravation from cold; amelioration from warmth.—SULPHUR is credited with the power of exciting into action the vital forces when they have begun to flag and thus fail to respond to the indicated remedy. It acts best in persons of rough, harsh skin, subject to eruptions of various kinds, with rawness and soreness whenever there is a fold of skin (axilla, groin, etc.), and whose body exhales an offensive odor which is not due to lack of cleanliness. Children who are good subjects for SULPHUR usually have a large head with open fontanelles (CALCAREA), and suffer from lack of assimilation; they are great eaters, yet remain scrawny and thin. Faintness and “goneness” at the stomach, craving for food, especially at 11 A. M.; heat on the top of the head, with coldness of the feet. Flushes of heat, with coldness of the feet, and epigastric weakness. Cannot take milk; the child vomits it up, curdled.—Other remedies to be consulted here are MERCURY, PHOSPHORUS, ARSENIC, AURUM, ASAFETIDA.

Scarlatinal Nephritis.—The patient, if a convalescent, must be returned to bed at once; the room must be kept at a temperature of 72° to 75°, and every precaution taken not to let him take cold. His diet must be liquid, preferably milk; in fact, as has been pointed out, a milk diet throughout scarlet fever is said to greatly reduce the danger of the occurrence of this complication; broths in moderate quantity and starchy food may be allowed. An abundance of cool, but not cold, water will prove grateful to the sick and of benefit in flushing the kidneys. Hot baths (98° to 100°), for 15 to 20 minutes, are highly recommended. The patient, having been taken to bed after the bath, is warmly covered to stimulate sweating. If the attack is severe, and the bath agrees, it is to be repeated two or three times daily. If the patient strongly objects or becomes restless in the bath, it must be discontinued. Diaphoresis may also be produced by placing the patient in a chair; blankets are wrapped all about him, and under the chair, in a plate, a thin layer of alcohol is burned. Care must be exercised not to spill the burning alcohol and thus set the blanket on fire. Or bottles filled with hot water, wrapped in wet cloths or towels, may be placed for the same purpose, about the child in bed. Of medicinal diaphoretics, philocarpine is by all means the most efficient. It may be given by the mouth in doses of from $\frac{1}{40}$ to $\frac{1}{20}$ of a grain to a child two years old, every four to six hours, repeated until the sweat glands, the salivary glands and the kidneys are excited into action.

APIS has already been pointed out as one of our most valuable remedies here. The urine is scanty, dark-red, contains epithelium, casts, and blood. There is œdema, anasarca; waxy appearance of the surface; bronchial catarrh; difficulty of breathing; orthopnoea; thirst (study also indications given above).—ARSENIC in its pathogenesis presents every symptom of nephritis and has an excellent clinical record. The chief symptomatic indications are: dryness of the skin, which may be cold, but oftener is dry and hot; characteristic restlessness; emaciation; weakness from slightest exertion; seeming impossibility to rally; relief from warmth in any form; great thirst; nephritic urine.—HELLEBORUS NIGER when in the course of this complication the brain becomes poisoned and the patient presents stupidity almost to insensibility, with severe pain in the

head, compelling him to lie perfectly quiet; great thirst; difficult breathing; excessive muscular weakness and prostration; rolling of the head in the pillow from side to side, with moaning, grinding of the teeth, squinting; the urine is very scanty and very dark, almost black, with coffee-ground sediment.

The following may also be consulted in exceptional cases: in *nephritis*, TEREBINTHINA, DIGITALIS, MERCURIUS CORROSIVUS, KALMIA, ASCLEPIAS SYRIACA; in the *anginose* form, LYCOPODIUM, KALI CARBON., BROMIUM, BARYTA, IODIUM; in *mastoid* complications, PHOSPHORUS, ASA FÆTIDA; in *collapse*, CARBO VEGETAB.; in the *fulminant* form, ACIDUM HYDROCYANICUM.

MEASLES.—MORBILLI.

General Description and Causation.—An acute, infectious, highly contagious disease, characterized by symptoms of catarrhal involvement and a peculiar eruption. It is largely a disease of childhood, especially after the first year, though adults frequently have it, particularly those not protected by a previous attack. It occurs in sporadic and epidemic form, the latter much more frequently; it is liable to appear at any season of the year, but oftener during the cold months of late fall, winter and early spring. The contagion, susceptibility to which is almost universal, is communicated chiefly through the breath and the nasal secretions; hence, possibly, the preference of measles for the respiratory organs. It may be conveyed by a third person and by fomites. The disease has been propagated by inoculation with the nasal mucus. It may recur, though usually one attack confers immunity.

Symptoms.—The period of incubation continues for ten or more days. The stage of invasion is characterized by symptoms of "a cold," the patient complaining of shivering more or less fever, headache, rarely convulsions, loss of appetite, sneezing, watery discharge from the nose and eyes, with swelling and redness of the eyelids, often great sensitiveness to light, and cough. Moderately sore throat is frequently present. The catarrhal symptoms continue; the tongue is covered with a heavy white fur, a few red papillæ showing

through the coating; the fever reaches a considerable height on the second and third day (102°-104°); usually on the third day the oral mucous membrane assumes a condition of marked hyperæmia, showing a more or less clearly defined punctiform rash, especially about the fauces. With the fourth day, the stage of eruption begins. This eruption consists of red papules, usually small, sometimes as large as a split pea, slightly raised, sometimes "shotty" to the touch, but at no time involving the deeper layers. It first shows itself on the face, and extends downward, rapidly covering the neck, breast, trunk, and extremities; on the latter it is comparatively light and scattered. The face lacks that whiteness about the mouth which is so often present in scarlet fever. The eruption arranges itself so as to form blotches, with well-defined, rounded outlines, crescent-like in shape; this is particularly well-pronounced on the face and upper chest; it is more mottled and blotchy, as well as lighter, on the lower part of the trunk and on the abdomen. Viewed as a whole, the eruption is of a deep rose-color, almost crimson; purple rather than scarlet, resting on a hyperæmic base, with intervening patches of normal skin on the face and body, the hyperæmia disappearing upon pressure, to return as soon as pressure is removed. If the case is one of unusual severity, petechiæ may be present; it is, however, worthy of note that the petechial character of the eruption is often seen in cases of only moderate severity, some epidemics showing such a tendency; in other cases miliary vesicles may develop. The appearance of the eruption is not followed by lessening of the fever or of the constitutional symptoms; on the contrary, the catarrhal state is maintained with little change for the better; the lymph-glands are swollen and sore, and the temperature remains high until the fifth or sixth day, when, usually, improvement in every respect shows itself.

The period of desquamation begins within two or three days after the appearance of the eruption, desquamation proceeding in the order of the appearance of the rash, beginning on the cheek, forehead, face, and extending downward. It occurs in bran-like scales, so fine as to be almost invisible; they are best seen "when one brushes the skin of the patient with one's coat sleeve" (Trousseau). As the eruption disappears, the fever promptly decreases, the catarrh diminishes, and rapid convalescence is established.

Varieties.—Cases may abort, showing the general picture of the disease, but presenting no eruption (*morbilli sine morbillis*); this most frequently happens when an entire family is ill with measles and some members show only slight susceptibility to the contagion. Or the eruption may appear earlier than common, even within thirty-six hours from the onset of the disease; or it is delayed to the fifth or sixth day. Under specially unfavorable conditions the hæmorrhagic tendency may be well-pronounced, accompanied with very severe constitutional symptoms, great depression of the vital forces, and death from toxæmia. In civilized countries this form has almost disappeared, save where the surroundings are bad or the patient, from a low state of health, such as is found among the neglected poor, readily falls a victim to any severe illness; thus in poor-houses and in camps this form (*morbilli hæmorrhagici*) is often seen, while in private practice it is rarely met. It has also been observed that for the same reason native populations, especially when first exposed to measles, suffer from the most virulent manifestation of the disease. The term *typhoid* form is merely a term of convenience, self-explanatory. The *black* measles of the older writers probably were cases of hæmorrhagic small-pox.

Complications and Sequelæ.—Measles, uncomplicated, is a comparatively harmless disease; but complicated, its death-rate is high. The early and extensive involvement of the *respiratory* system constitutes a source of great danger, especially in weak or badly nourished children and in those who are placed among unsanitary surroundings; there the bronchial catarrh may become intense, involve the smaller tubes, and rapidly lead to collapse of tissue or *broncho-pneumonia*. *Membranous laryngitis* not infrequently develops, and is always a dangerous complication; the pharynx may be similarly involved; *cancrum oris* and *stomatitis* are occasionally present in strumous children. Catarrhal affections of the eyes and ear, the former eventually purulent, the latter with a tendency to suppuration and perforation of the ear-drum, are common, and yield reluctantly to treatment. Or *diarrhœa*, in exceptional cases dysenteric in tendency, may become an annoying feature of the case, at times even determining a fatal issue.

The sequelæ proper really consist of those secondary affec-

tions which are the result of great drain made upon a weak constitution, acting as the exciting cause of tendencies lying dormant, in the system. Thus, *tuberculosis* often occurs as a sequel in persons of phthisical tendency who have suffered from severe involvement of the respiratory organs; *post-febrile forms of paralysis* occur less often. In scrofulous subjects *necrosis* (of the jaw-bone), *noma*, the latter generally fatal, have been noted, but rarely. "Noma does not arise spontaneously, but is preceded by some slighter lesion of the same parts, such as a decayed tooth, an inflamed gum, or an infantile leucorrhœa respectively." (Thomas.)

Diagnosis.—This rests chiefly upon the presence of characteristic catarrhal symptoms, beginning early in the stage of invasion and continuing well into the stage of desquamation; upon the continuance of the fever after the eruption appears; the lightness of the throat symptoms; the nature of the eruption. These alone are sufficient to distinguish measles from scarlet fever, especially so in the presence of epidemics of one or the other. The diagnosis from *roetheln* often presents great difficulty, and may be impossible. Of *drug-eruptions*, that of *copaiba* and of several antipyretics resembles morbilli, but there is absence of catarrh and fever. *Coryza* has much less fever, no exanthem. *Hay-fever* occurs in repeated attacks, at a season of the year when measles is not liable to be found, and has no exanthem.

Prognosis.—The disease itself is rarely fatal, but the gravity of several of the complications seriously affects the prognosis. It is stated by Thomas that in the first six months of life the disease generally is mild; later in infancy, especially during the next year, it is much more serious. Pregnant and lying-in women, as well as feeble, old people, are usually very ill. Fagge gives the mortality of measles as varying from 2 or 3 per cent. in some epidemics to 50 per cent. in others. Trousseau lost with broncho-pneumonia twenty-two out of twenty-four children under his care in the Necker Hospital (1845-1846). As pointed out, in camps and hospitals an outbreak of measles is to be dreaded and the prognosis is much more serious than in private practice.

Treatment.—Prophylaxis is practically out of the question, owing to the volatile character of the specific poison. The dis-

ease is communicated by the breath of the patient and by exhalations of his body. Slight danger, if any, exists of communication by a third person or by articles from the sick-room.

The patient must be kept in a well-ventilated room of about 70°, in which the air should be kept slightly moist and from which direct light has been excluded; he should be isolated as far as circumstances permit and put upon an easily digested, nourishing diet, preferably liquid, as milk. If the eruption is tardy in coming out, the time-honored custom of giving warm drinks and a hot bath is to be followed. If the fever is quite high, sponging or bathing in tepid water may be practiced. Great pains must be taken to keep the sick one away from currents of air, since "a cold" is a very serious thing at any stage of the disease, and there is special susceptibility to taking cold during the stage of eruption. During desquamation, the use of oil on the skin and of warm baths is advantageous. Every precaution must be taken throughout convalescence to prevent taking cold. Stimulants may be demanded in exceptionally severe cases when there is fagging of the vital forces, and in cases of pronounced cachexia from poor living or other causes.

In the simple, uncomplicated case medication is said to be of secondary importance. Yet, the clearly indicated remedy will relieve existing symptoms, ward off complications, and hasten recovery. Here, PULSATILLA, GELSEMIUM and ACONITE are most frequently useful.

PULSATILLA so completely covers the catarrhal and gastric symptoms which almost from the start accompany measles, that in cases with moderate fever and slight gastric uneasiness no other remedy may be required. PULSATILLA has coryza, now fluent, then dry; sneezing; congestion of the eyes; irritated and inflamed, itching eyelids, often with profuse lachrymation. Frequent cough, dry during the day, loose at night, especially after lying down; the child insists upon sitting up in bed while coughing. Earache; loss of appetite; vomiting of mucus after coughing. Fever, with heat in the head, dryness of lips, absence of thirst, diarrhœa. It is useful also later on, when the gastric symptoms are more troublesome, and there is gastric and abdominal flatulency, vesical irritation, difficult breathing, ringing in the ears, deafness and semi-purulent or purulent character of the discharges.

with violent stitching pain extending from the ear to the roof of the mouth and to the parotid on the affected side. Loud, rattling cough, with difficult expectoration of tough, stringy mucus; roughness of the larynx, with hoarseness; wheezing and rattling in the throat and chest, when sleeping. Later the catarrhal discharges become purulent; thus, from the nose: thick, greenish discharge, with sensitiveness and ulceration of the nostrils; from the eyes: purulent discharge; the cornea is inflamed, and pustules form on it; the ear: discharge of offensive mucus.—**HEPAR**: Sharp, darting pain in the ears, with crackling noise in them when blowing the nose; hoarse, croupy cough, with rattling in the chest, but no expectoration; roughness and scraping sensation in the throat. Eruption comes out slowly; is pale.—**IPECACUANHA**: Incessant, dry, tickling, teasing cough, with rattling of mucus in the chest; great difficulty of breathing; face pallid or purplish-blue. The eruption is tardy.—**ANTIMONIUM TARTARICUM**: Chilliness, with sneezing and fluent coryza. Great oppression in the chest; he coughs often, and it sounds as though the chest were filled with mucus (loose râles), but he cannot raise anything. Cough followed by yawning, especially in children.—**PHOSPHORUS**. The voice is hoarse and rough. The cough is dry, tickling, exhausting, and there is a sense of great tightness in the chest, with relief from external pressure. Cough worse from speaking or laughing. Involvement of the lower lobes. Watery diarrhoea. Typhoid condition.

Other remedies which may be indicated are: **SULPHUR**: Eruption tardy; lack of response to indicated remedy; condition threatens to become chronic; dry, hacking cough, especially in the evening, when lying down; with itching in the bronchi, stitching pain in the throat when swallowing, and stitching pain in the chest, extending back to the scapula; bronchopneumonia.—**STICTA**: Incessant dry cough; racking, spasmodic cough, excited by inspiration; from tickling in the (right) side of the trachea; oppression of the chest; worse during the evening and at night.—**MERCURIUS**: Coryza; sneezing without relief; profuse flow of tears; pharyngeal inflammation; intestinal catarrh; soreness in the chest, with deep hard cough and expectoration of foul, purulent matter.—**DROSERA**: Paroxysms of cough, sounding like whooping-cough, after measles; worse in

the P. M.; occasionally attended with bloody, purulent expectoration.

In addition to these remedies, flax-seed tea, slippery elm, solutions of gum arabic, and other demulcent drinks, cold or hot, may be freely given. A layer of flannel with oiled silk may be applied to the chest, the chest being also bathed in camphorated oil. These measures do not in any way interfere with the action of the remedies, and by keeping the chest warm and producing a slight irritation there, the eruption may be brought out more fully and maintained for a proper length of time, thus greatly relieving the respiratory system.

BELLADONNA, BRYONIA, CUPRUM, STRAMONIUM, possibly ZINCUM, will prove useful when at any time, from retrocession of the rash or from other cause, violent cerebral involvement occurs.—ARSENICUM, RHUS TOX., LACHESIS, CROTALUS, CAMPHOR, when malignancy of the disease produces marked nervous prostration, typhoid state or collapse.

For the special treatment of complications or sequelæ consult the respective chapters under which they are discussed.

RUBELLA.

*Synonyms: Roetheln; German Measles; French Measles.
Rubeola notha.*

An acute, infectious disease, characterized by the absence of well-defined initial symptoms, an eruption resembling that of measles, catarrh, and enlargement of the lymph-glands.

A micro-organism, not yet isolated, is the cause of this mildly contagious affection, which may be conveyed by a third person, fomites, etc. It attacks persons of all ages, but shows a decided preference for the young, seventy-five per cent. of the cases occurring before fifteen years of age; infants are rarely the victims.

The period of incubation covers the unusually long period of from ten to twenty, and even more, days; the stage of invasion is proportionately short, rarely more than twelve to eighteen hours. The most striking feature of the disease is the

eruption, the appearance of which is in some cases preceded by malaise, moderate elevation of temperature, some catarrhal involvement of the conjunctiva, nose, pharynx, and larynx, and swelling of the cervical lymph glands; in others the eruption is the first symptom observed. The rash appears as minute, deep or bright rose-red spots, smaller than measles, circular, and rarely presenting the crescent-like form of morbilli; they are slightly elevated, and almost always discrete. Their appearance has been described as "dark-red, with pen-points in white blotting paper." They are first seen on the forehead and temples, and spread downward over the face, chest, and body. The eruption remains rather longer than that of measles, but usually on the third day fades and disappears without decided desquamation; in some cases I have observed bran-like, scurfy desquamation; the skin is left slightly stained. The constitutional symptoms vary in severity, though they are hardly ever intense. In some cases the temperature is scarcely affected; in others it may be as high as 101° or 102° , and may remain so for two, rarely more, days. Occasionally the fauces are considerably congested, in which case there is a visible exanthem of the fauces and pharynx; in others, symptoms of conjunctival, nasal or laryngeal catarrh are fairly pronounced. Again, the lymphatics may be considerably enlarged, involving not only the cervical, but other lymph glands as well. These enlargements do not continue long. Quite often the concomitants are so insignificant as to escape notice. While in weakly, badly nourished subjects complications may arise here, as in other exanthematous fevers, rubella is singularly free from complications and sequelæ, and runs so mild a course that the prognosis of the disease is absolutely favorable and treatment of any kind is required in exceptional cases only.

In differentiating rubella from measles, the history of the case as to previous attacks of measles, the brevity of the stage of invasion, the early appearance of the eruption, the mild character of the catarrhal symptoms, the comparatively extensive involvement of the lymph glands, the trivial character of the fever, and the absence, usually, of a proper stage of desquamation, must establish the diagnosis of rubella. If any treatment is deemed advisable, the measures recommended in the preceding chapter (measles) may be employed. Isolation of the patient is always advisable.

VARIOLA.—SMALLPOX.

General Description and Causation.—An acute, infectious disease, whose onset is characterized by rigor, fever, headache, and severe pain in the loin, and whose most striking feature consists of an eruption which passes through well-defined stages of development to maturation and crust formation.

The disease spares no age, sex or race. In former times widespread epidemics of smallpox were of frequent occurrence, with a mortality of from 80 to 90 per cent. among the more intelligent nations, and entirely wiping out of existence aboriginal races. The protection afforded by vaccination and modern methods of treatment have robbed the disease of its old-time terror.

The specific virus or poison of the contagium is as yet unknown. It is volatile, for direct contact with the patient or infected matter is not necessary to produce the disease. It exists in the exhalation from the lungs and skin and in the excretions. It may be conveyed from person to person, by direct contact or by fomites. Its virulence is such that carriages, street cars, berths of steamers or railway trains, occupied by one sick with the disease, even during the period of incubation, long before the appearance of pustules, are sure to communicate it to persons later occupying them. Infection from a very mild case may give rise to a severe form of smallpox. It rarely attacks the same person twice.

Symptomatology.—The stage of incubation, usually covering a period of from seven to twelve days, is followed by the stage of invasion, of which a rigor, more or less severe, and occasionally repeated during the next twenty-four hours, is the initiatory symptom in adults, while in children it more commonly begins with convulsions. Intense frontal headache, severe pain in the back and limbs, anorexia and vomiting follow; the backache and the pain in the legs are intense; in fact, more so than in any other eruptive fever. Fever now declares itself; the pulse is rapid, full, rarely dicrotic; temperature rises quickly, and may even on the first day reach 103° or 104°; the skin is dry, hot, pungent, free sweating occurring

in exceptional cases; restlessness and sense of general distress are marked; delirium may be pronounced if the fever is high; in children, under the same condition, convulsions may continue. On the second or third day the initial rash may appear, a diffuse (scarlatinal) or macular (measly) erythema, which usually is limited to the lower abdomen, inner surface of the thighs, lateral thoracic regions and axillæ, but may be general. On the fourth day, sometimes at the end of the third day, the *stadium eruptionis* begins, accompanied by decided lessening of the fever and of the constitutional symptoms. Small red dots show on the face (especially at the junction of the hair) and wrist, and within twenty-four hours cover the trunk, arms, and legs. On the fifth and sixth day these change into papules (*stadium floritionis*) which convey to the hand passed over them a soft, satin-like "feel." On the top of these, vesicles form, the whole papule being elevated, circular, and slightly depressed in the center (*umbilication*). These vesicles enlarge, umbilication disappears, the flat top rounding, and their contents assume a grayish-yellow color, due to the presence of pus (*stadium suppurationis*). The pustule itself is surrounded by an area of intense redness, and a generally œdematous condition of the surface prevails. The papules having appeared first on the face, the formation of pus begins there, progressing in the order in which the eruption developed.

The formation of pus on so large a portion of the surface of the body causes a rise of the fever (*the secondary fever of variola*) and a return of constitutional accompaniments. The pustules increase in size, and the swelling and tension of the parts give rise to much distress and pain, especially in the face. The appearance of the patient at this stage is repulsive. The eyelids are swollen and the eyes closed; the lines of the face and its natural expression are obliterated; the hands are intensely inflamed, especially on the dorsal surfaces. The eruption is least troublesome on the "femoral triangle" of Simon (hypogastrium and inner surfaces of the thighs). The mucous membrane now becomes involved (mouth, throat, tongue, soft palate, nares, larynx, trachea, œsophagus), being studded with small superficial ulcers which may become confluent, and always cause pain, soreness and swelling, with difficulty of breathing and swallowing and, in case of laryngeal involve-

ment, temporary loss of voice. The rise of temperature continues for twenty-four hours, rarely longer, and then drops to about 100°.

On the tenth or eleventh day, sometimes not until the thirteenth, convalescence begins. Many of the pustules have burst, emptying their contents and thus affording relief to the painful tension and tightness of the skin. Yellow crusts form, and within a few days these crusts and scabs begin freely to fall off (*stadium exsiccationis*). This process is accompanied by intense itching of the skin, often a source of the greatest discomfort to the patient. Pigmented spots remain for a long time, and in case of deep ulceration, involving the cutis vera, a permanent scar is left. This is the general history of the *discrete* type of smallpox.

The *confluent* form presents the same initial symptoms, but in a majority of cases is characterized by greater intensity of morbid action and correspondingly greater danger to life. Sydenham laid down the general rule that the more freely the eruption shows itself before the fourth day, the more sure to prove confluent. In some cases the papules are at first isolated, and show no tendency to become confluent until pus is forming. More frequently the hyperæmia of the skin is intense from the start, and the papules are thickly scattered over the face, hands and feet, though much less so on the limbs and, especially, on the trunk. All observers subscribe to Sydenham's statement "if upon the face they are as thick as sand, it is no advantage to have them few and far between on the rest of the body." Pustules form, here as in the discrete type, with the same secondary fever; but the hyperæmia is so intense and the whole process so typically destructive that even before its completion confluence takes place, and all the face and the extremities form one large superficial abscess. Fever and constitutional symptoms are severe, the temperature reaching 104°, the pulse 120, and active delirium often existing. There is much thirst, with salivation in adults and diarrhœa in children. The ulceration of the mucous membrane is persistent, and the cervical and lymphatic glands swell. In case of recovery, desiccation begins on the eleventh day, and progresses very slowly, occupying two or three weeks; the fever may continue throughout the third week. In fatal cases a change for the worse shows itself

about the eleventh day; the pulse becomes rapid and weak, hæmorrhagic symptoms occur, and death takes place from exhaustion.

Hæmorrhage into the papules or pustules may occur at any time without necessarily increasing the gravity of the prognosis. Persons who are deficient in powers of resistance, as aged people or persons debilitated from illness or vicious habits, readily suffer thus. A very serious form, however, is the so-called *Black small-pox* (*variola hæmorrhagica pustulosa*) in which the disease from the start assumes a threatening severity, and where, in addition to the hæmorrhagic character of the external eruption, the same process takes place in the mucous membrane at large and in the internal organs. This type is quickly fatal, death taking place within two to five or six days.

The term *purpura variolosa* is applied to a type more frequently found in young, vigorous, full-blooded persons, men oftener than women, in which the hæmorrhagic tendency is acute in character and manifests itself from the beginning of the disease. In these cases the usual early symptoms of small-pox are quickly followed, even on the second or third day, by cutaneous ecchymoses which increase in size with startling rapidity, quickly succeeded by, or accompanied with, effusions of blood into the conjunctivæ and bleeding of internal organs, giving rise to hæmaturia, hæmatemesis, hæmoptysis, and melæna. So extensive are the cutaneous ecchymoses in some cases as to give to the patient a plum-colored appearance. The pulse is rapid and small; breathing superficial, and in its frequency out of proportion to the intensity of the fever; there may be delirium, but often the mind is clear to the end. In these cases a fatal termination may be reached before the eruption proper has appeared.

Varioloid is that form of the disease which occurs in persons who by previous vaccination are protected against smallpox proper. It is simply variola, modified. It may come on gradually or its onset may be sudden; in either case the fever is fairly high, often reaching 103° quite early, and the headache and backache are severe. The papules appear on the third or fourth day, are discrete, rarely numerous, and commonly confined to the face and hands; their appearance is followed by immediate relief of constitutional symptoms. The papules rapidly

pass to maturation; owing to the moderate excitement which accompanies the limited pus-formation, secondary fever is trivial, recovery prompt, and scarring rare.

Complications.—The *larynx* often becomes diffusely involved; there may be extensive necrosis or fatal œdema. The lack of sensibility in the larynx may be such that particles of food are allowed to reach the lower air passages and excite *bronchitis* and *broncho-pneumonia*; the latter affection is commonly found in examinations, *postmortem*; *pleuritis* is rare. The *pharynx* is frequently the seat of extensive ulceration, and pseudo-diphtheritic angina develops in many severe cases. Of the affections of the heart, *myocarditis* is the more common. The pressure upon the nervous system is marked. In the earlier stages convulsions are frequent in children; in severe cases of adults there may be delirium with tendency to coma. Post-febrile insanity and various forms of paralysis have been noted during convalescence. *Orchitis* and *ovaritis* occur; true nephritis is rare; *albuminuria* is frequent.

Painful *boils*, *erythematous* conditions and even gangrenous inflammations often and for a long time continue a source of annoyance and suffering. There may be *arthritis* and *necrosis* of bone. *Otitis media* results from extension of inflammatory action through the Eustachian tubes. Affections of the eye, though not always avoidable, are usually the result of indifferent care of the eye during the height of the disease, purulent discharges being allowed to come into contact with the conjunctiva, resulting in purulent conjunctivitis and even diffuse keratitis, possibly with ulceration and perforation.

Diagnosis.—The only difficulty in diagnosis depends upon the close similarity of smallpox, especially of the severe type, during the stage when the eruption is forming but has not yet become pronounced, to very severe cases of scarlatina, measles, cerebro-spinal fever with purpuric symptoms, glanders of the pustular form and, in rare cases, syphilitic eruptions; in such cases patient watching for the appearance of pathognomonic symptoms and a careful estimate of all the circumstances of the case can alone finally establish the diagnosis.

Prognosis.—In persons not protected by vaccination the prognosis is always serious; statistics show that in this class the mortality ranges from 20 to 35 per cent. The severe con-

fluent form, especially in children, is always dangerous, particularly so when maturation is delayed and hæmorrhagic effusion occurs. The possession of sufficient vitality to stubbornly resist the morbid action is greatly in favor of the patient, and those who lack in this direction, as persons who are debilitated from previous illness, or from old age, or from vicious living, furnish a very large mortality. Hæmorrhagic effusions are always to be dreaded and are almost surely fatal when the constitutional symptoms are grave. If on the start the pressure upon the nervous system is profound, the fever unusually high, delirium marked, and subsultus present, the outlook is discouraging. The existence also of severe laryngitis or pharyngitis and, in women, of pregnancy greatly complicates the issue.

Reference has already been made to Sydenham's well-proved declaration that abundant eruption on face and hands always indicates danger; to this may be added the statement of Rhazes, "when the fever increases after the appearance of the pustules, it is a bad sign; but if it is lessened on their appearance, that is a good sign."

Treatment.—Prophylaxis.—Prominent among all prophylactic measures stands *vaccination*, the inoculation of man with cow-pox for the prevention of smallpox. The inoculation may be performed at any time, preferably in infancy between the third and sixth month, and, to give perfect immunity, should be repeated at periods of five or six years. At the outbreak of an epidemic, vaccination or revaccination should be performed at once. "Points of selection for the operation are about the insertion of the deltoid or the junction of the heads of the gastrocnemius muscles. In protection against future carelessness regarding revaccination, the matter may be introduced at three places, at the angles of a triangle at least half an inch distant from each other. Six or eight parallel tracings or strokes, with as many cross strokes, with the point of a knife, so light as to expose the superficial lymphatics and draw little or no blood, afford the best wound, upon which the moistened bone surfaces may be gently rubbed." (Whittaker.)

Either animal or humanized virus, from persons previously vaccinated, may be used. The lymph from a vaccinated pustule, pure or in glycerine, may be kept for a long time in a her-

metically sealed tube or small phial without losing its efficiency. The crust itself is preferred by some, and may be kept between disinfected glass plates, carefully glued together. In forty-eight hours after vaccination redness and swelling occur at the sight of the insertion, a papule forms, which develops into a pustule, reaching its maximum on the seventh or eighth day. At that time it is umbilicated and surrounded by a bright, red areola which enlarges for several days until it reaches a diameter of from two to three inches; this areola constitutes the sign of successful vaccination. The formation of pus in the vesicle is completed on about the tenth day. A crust gradually forms, which falls off on about the twentieth to the twenty-fifth day, leaving behind it a cicatrix, a circular depression marked by dot-like depressions and radiating lines, which in due time becomes white; this remains for years, perhaps permanently. This process is accompanied by moderate fever, headache, nervous excitement, manifested by restlessness and sleeplessness and swelling of the axillary glands; these symptoms subside promptly when incrustation begins. Usually they are slight in young children, but increase with advancing years; in persons of very nervous temperament they are often quite pronounced, and in scrofulous subjects untoward symptoms may develop.

It is not wise to deny that vaccination has immensely reduced the number and frequency of small-pox epidemics, the rate of mortality, and the severity of the symptoms in the individual. No doubt, improved sanitary conditions and better modes of living among all classes have also done much in the same direction. The objections urged against vaccination are based upon the danger of introducing into the human system, by means of the virus, tuberculosis, syphilis, and erysipelas. Without attempting to call into question the force of these objections, it is but fair to state that instances are comparatively very rare where this has actually occurred, and that the dangers from vaccination are not as great, relatively, as are those connected with many an operation daily made for the relief of evils far less threatening than an epidemic of variola.

In case of an outbreak of small-pox, measures should be taken to protect the community against infection by the exercise of strict quarantine over the sick, over all suspected

parties, and over the locality in which the case occurs. Vaccination should be made compulsory, and should be enforced without fear or favor; a person's conscientious objections to vaccination do not lessen the danger of his carrying the infection to others, and of thus spreading disease and death. If the community has no public hospital for the treatment of infectious diseases, it becomes the duty of the authorities to provide a suitable building, decently equipped, pleasantly located, easy of access, yet isolated. Placards should be posted on infected houses, and every precaution taken to keep the public from infected localities. The patient should at once, *but with every regard for his own comfort and safety*, be taken to the hospital; or if that is not practicable, he must be installed in some room, best in the uppermost story of the house, where he is isolated from other occupants of the same building. The room must be stripped of all unnecessary furniture, and from the moment of its occupancy disinfection of everybody and everything in the room or passing from the room must be conscientiously practiced. Small articles which have been used are to be burned; clothing, bedding, towels, handkerchiefs, etc., are to be disinfected by the use of carbolic acid or chloride of lime, or mercuric chloride (see rules for disinfecting under typhoid fever). Sheets wrung out of strongly carbolized water may be hung up in the room, before the door, and deodorizers and antiseptic solutions kept in the room to render the air agreeable and pure. If at all possible, a room with an open fire-place should be used, and a moderate fire kept constantly burning. The linen must be changed often. The bed-covering should be light. The hair had better be cut short; by so doing "matting" will be prevented, the patient made more comfortable, and decomposition of crusts avoided. Cool drinks may be given freely; barley-water, crust-coffee, oat-meal water, cool porridge, etc., may be used as the preference of the patient indicates. Milk, broths, butter milk, ice cream, any light and easily digested food, may be allowed; if there is angina, small lumps of ice may be taken into the mouth. During the fever, cool sponge-baths are comforting; if there is hyperpyrexia, a bath at a temperature of 70° may be given every three hours until the fever is reduced to, or below, 103° . The bath is preferable to medicinal antipyretics. The mouth and throat must be kept

clean, and injections of oil or milk and water are to be made into the nose if filled with dry crusts. The eyes must be carefully cleansed to prevent complications already described; a mild antiseptic wash may be applied to the conjunctivæ. In serious cases, if the patient is greatly exhausted, and bedsores or abscesses have formed, these must be watched closely and treated judiciously; a water-bed or the continuous warm bath may here be useful. Stimulants are indicated by quick and feeble pulse and a condition of asthenia. Tracheotomy may become necessary in excessive laryngeal œdema or obstruction of the larynx from other causes.

During convalescence daily bathing must be kept up, carbolic acid soap being used liberally; the patient is not to be considered sufficiently well to again meet others until the skin is perfectly smooth and absolutely free from scabs. Even then, before giving him his liberty, it is wise to administer a full sponge bath, using a solution of corrosive sublimate (1:2000); this is to be washed off cautiously in a thorough warm bath, with carbolic acid soap.

The prevention of pitting has always occupied the attention of medical men. It is well to keep crusts moistened with vaseline, oil, or glycerine, to prevent desiccation and the diffusion of flakes of the epidermis, and to relieve the intense itching. Ripening pustules, especially on the face, should be covered by a light mask of lint moistened with a medicated solution, and covered with oiled silk. For this purpose solutions of carbolic acid and of mercuric bichloride are useful. Careful emptying of the ripening pustule by means of a fine needle and light touching of the pustule with a stick of silver nitrate have also been recommended for the prevention of pitting. Bearing in mind that pitting depends wholly upon the depth to which the ulcerative process in each individual pustule reaches, the difficulty of the task is readily understood. Hale recommends a solution of peroxide of hydrogen (1:10). I have found a solution of the aqueous extract of *HYDRASTIS CANADENSIS* exceedingly satisfactory; either solution should be constantly applied by means of the lint face-mask. Solutions of *TARTAR EMETIC* have also been used for the same purpose, with, it is claimed, good results; Coste, of France, recommends boric acid solution. In case these moist applications are not used, either because of

the lightness of the attack or the establishment of convalescence, it is well to use vaseline, oil, or glycerine, to prevent the diffusion of flakes of the epidermis and to relieve intense itching.

In case of the death of the patient, common sense suggests the necessity of immediate and private funeral, of thorough disinfection of the body with corrosive sublimate (1:500), and of every possible precaution, including thorough disinfection of the room and house occupied during the illness and of the hearse and conveyances used at the funeral.

The attendants, including the physician, must also subject themselves to personal inconvenience for the sake of their own safety and that of the public. The number of nurses in attendance should be small; they must be persons well protected by a previous attack of the disease or by vaccination. They must never leave the sick room, even for a short time, without careful washing of face and hands, using carbolic acid soap freely, and mercuric chloride, in weak solution, on the hair. The same precautions are to be taken by the attending physician; since he is forced to come in contact with others, it is an excellent plan to devote one suit of clothing to visits upon smallpox cases, changing them each time he leaves the infected house, and exposing himself for a considerable length of time to the fresh air before visiting other patients. A mackintosh, buttoned up to the chin, should be worn in the sick room.

Therapeutics.—In the early stage of small-pox *ACONITE*, *VERATRUM VIRIDE* and *BELLADONNA* are of value. The indications are familiar.—*VERATRUM VIRIDE* covers severe pain in the back more fully than does *ACONITE*, has much nausea and vomiting, and very great early prostration. Both have intense fever, but under *VERATRUM* the pulse is less sharp and sometimes irregular, while under *ACONITE* the general tension is more pronounced, with the characteristic restlessness, thirst, and general excitement peculiar to it.—Under *BELLADONNA* violent congestion, especially cerebral, is expressed by the throbbing carotids, congested eyeballs, full pulse, throbbing, bursting headache, and delirium. Erythematous and swollen condition of the skin, with great itching. Tonsillitis; entire throat swollen and painful; difficult deglutition, especially of liquids, which return through the nose. Hard, “breaking” backache.

Useful also in the last stage, with thread-like pulse, utter exhaustion, jerking of bed-clothes, frequent starting during sleep, purplish condition of the surface, bad throat with foul odor from the mouth, trembling tongue, stupor.—*APIUM VIRUS* in some respects resembles *BELLADONNA*, especially in its close relation to the skin-symptoms; it also covers in a striking manner the œdematous condition which may become an important complication, and bears a close relation to the kidney. Stinging, burning pains are felt in the skin and throat; there is considerable fever, with chilliness from slight motion or exposure; albuminuria; dyspnœa. May be called for in ovaritis as a sequel of small-pox.

During the stage of eruption and suppuration, *VACCININUM*, *VARIOLINUM*, *MELANDRINUM*, *ANTIMONIUM TARTARICUM*, *HEPAR SULPH.*, *HYDRASTIS*, and *MERCURIUS* are indicated.

VACCININUM, the attenuated lymph from the cow-pox vesicle, *VARIOLINUM*, the attenuated lymph from the small-pox, and *MELANDRINUM*, the attenuated lymph from the horse-pox vesicle, are isopathic remedies, and as such many practitioners are prejudiced against their use. Personal experiences with them, at least with *VARIOLINUM*, and the testimony of reliable and unbiased observers, have demonstrated the power of these preparations, if given in time, to greatly modify the results of exposure and often to insure complete protection and to so modify the suppurative process that the secondary fever and other concomitants of this stage are comparatively light, the eruption itself proceeding kindly through the various stages of its development. I have used *VARIOLINUM* in the 6th and 12th dec. trit., and consider it a most useful remedy.—*ANTIMONIUM TARTARICUM* is indicated when the eruption is tardy in "coming out," resulting in severe constitutional disturbances which point to the remedy. There is: great weakness, with much restlessness; white, pasty coating of the tongue; constant nausea, rendering the patient very uncomfortable; coolness of the surface, with bluish appearance; rattling in the throat and chest, with difficulty of breathing. In cases where the respiratory organs are involved in the beginning (dry tearing cough), or later, when typhoid symptoms exist. Should not be used higher than the 3d dec. trituration.—*HEPAR SULPHUR.* is especially useful in scrofulous persons, given to swelling of the

glands, in whom a slight scratch or tear of the skin induces a slowly healing sore. The presence of sore throat, with stitching pain, when swallowing, from ear to ear, and hoarse, croupy cough, are characteristics. It has proved very useful in the cases where during and after convalescence boils and other skin affections harass the patient.—HYDRASTIS CANADENSIS has proved of service because of its beneficial action upon the ulcerative process; clinical experience has shown that it favors kindly healing in the individual pustule, thus preventing pitting. In fact, provers of the drug have suffered from pustules quite like those of smallpox in appearance and development. There is much swelling, redness and itching of the skin; the mouth and throat are very sore and covered with pustules; intense aching in the small of the back; faintness and prostration; sensation of great weakness in the legs.—MERCURIUS is indicated when the sore throat with copious salivation, swollen, flabby tongue which takes the imprint of the teeth, and characteristic intestinal symptoms are marked.

When the case progresses unfavorably and the hæmorrhagic tendency shows itself, ARSENICUM becomes an important remedy. The general condition resembles that described under typhoid fever; the asthenia is well pronounced; the pustules lose their roundness, sink in, become flat on top, and, with their areolæ, grow livid, dusky; hæmorrhage into the pustules. Petechiæ. Diarrhœa.—LACHESIS and CROTALUS are important remedies, the latter especially. Great prostration; severity of constitutional symptoms, of a typhoid character; passive hæmorrhages from the orifice and into the mucous surfaces; scantiness and dark color of the urine; tormenting thirst; muttering delirium; coldness of the surface and extremities.—AMMONIUM CARBONICUM. "Hæmorrhagic diathesis from fluidity of blood and dissolution of red blood-corpuscles, tendency to gangrenous ulcerations, high-graded adynamia." Lilienthal.—AMMONIUM MURIATICUM "Eruption well developed upon trunk and upper extremities, but scanty on the lower; sore throat, with swelling about neck; hæmorrhages." Ibid.

Of other remedies, CIMICIFUGA has been highly lauded by writers for the relief it affords from the intense muscular pains and soreness which often it is so hard to bear, and, like SARRACENIA, has been credited with the power of favorably modifying

the disease so as to shorten its course and to prevent pitting. PHOSPHORUS, BRYONIA or KALI BICHROMICUM may be indicated by respiratory symptoms present. MURIATIC ACID, PHOSPHORIC ACID and RHUS TOXICODENDRON in typhoid states. CAMPHORA in unexpected retrocession of the eruption and symptoms of collapse.

VARICELLA.

Varicella, also called Chicken-pox and Spurious or False Pox, is an acute infectious disease which usually occurs as an epidemic, but sometimes is sporadic. It is peculiar to childhood from the second to the tenth year; susceptibility to it grows less after the sixth year, and practically ceases with the tenth or twelfth year. Its most striking feature is the characteristic eruption. Hebra and his followers maintain the identity of varicella with variola. Inability to produce either disease by inoculation with virus from the other, and the fact that an attack of one disease does not give immunity from the other, seem to disprove this claim. The stage of incubation lasts from ten to fifteen days.

Symptomatology.—In many cases the eruption appears without prodromata or constitutional disturbance. It consists of numerous discrete, raised, red papules which within a few hours assume a vesicular form, as large as a pea, or larger, and which in exceptional cases may even have a diameter of half an inch to an inch. These vesicles are irregular in outline, superficial, not umbilicated, save on the face, where a depression on the top of the vesicle is often noted. Only in exceptional cases is the rete Malpighii involved. The skin surrounding the vesicles is not infiltrated or hyperæmic. The contents of the vesicle become purulent within thirty-six to forty-eight hours, after which it shrivels, and a dark-brown crust forms. This falls off in three or four days, rarely leaving a scar, save in some cases on the face. Several fresh crops of vesicles may follow each other, showing the eruption in different stages of development at the same time.

The rash is first seen on the trunk (waist and chest), then

on the face, forehead and hairy scalp; it is usually abundant, and a hundred, or more, vesicles may be counted at a time.

Often no constitutional disturbances arise, the patient being able to be about the room throughout the illness; others, as prodromata, have slight fever, or light chill followed by fever, with general malaise, anorexia, vomiting, and aching in the back and legs. The temperature may reach a maximum of 102° ; if the fever is high, it does not yield with the appearance of the eruption, but continues until the latter fades. In exceptionally severe cases convulsions may occur.

Course and Prognosis.—The course of the disease is toward rapid and complete recovery, without serious complications. At times the itching is great, and the patient, especially if scrofulous, may by violent scratching cause ulceration of the broken surfaces, with much pain and subsequent scarring. In others the hæmorrhagic tendency may be pronounced and complicate the case. Some observers (Hutchinson, Eustace Smith) describe a form which occurs in weakly, badly nourished, cachectic children, in which necrosis extends deep into the muscular tissues with, often, involvement of the eye and possible loss of vision; these cases tend to a fatal termination. Mild nephritis and infantile hemiplegia are possible sequels.

Diagnosis.—If seen early, diagnosis is easy; if seen late, or the symptoms are exceptionally severe, it may be mistaken for smallpox. The diagnosis of varicella depends upon the isolated character of the eruption; its superficial nature; the absence, save at times on the face, of umbilication; absence of areolæ and general hyperæmia of the skin; absence of secondary fever and of amelioration of the fever from appearance of the eruption; mild character of constitutional symptoms.

Treatment.—As to general management, little is required beyond the exercise of common sense. It is prudent to keep the patient in bed; the diet should be light and nourishing; the face, to prevent scratching and scarring, should be covered with a light layer of lint, moistened with some soothing lotion. As to remedies, ANTIMONIUM TART., MERCURY, PULSATILLA, GELSEMIUM, BELLADONNA, THUJA, and others, may be indicated.

EPIDEMIC INFLUENZA.

Synonyms: La Grippe.—The Grip.—Russian (or Chinese, Spanish, etc.) Catarrh or Fever.—Epidemic Catarrhal Fever.

An acute, infectious fever, characterized by early and profound prostration of the vital forces, quite out of proportion to the fever existing, with symptoms of severe catarrhal involvement of the respiratory and gastro-intestinal mucous membrane, marked disturbance of the nervous system, and tendency to complications and sequelæ which in seriousness overshadow the original disease.

The disease has been known from early times, and can be clearly traced back to, at least, the twelfth century; on the American continent it first appeared in Massachusetts and Connecticut, in 1627; the last severe epidemic, 1889 to '90, swept over the entire country, and reappeared during the two following seasons. It is first sporadic, then becomes epidemic and practically pandemic, overwhelming entire countries and continents with startling rapidity.

Ætiology.—Pfeiffer, of Berlin, in 1892, discovered in the pus-cells of tracheal mucus the micro-organisms which are peculiar to epidemic influenza. It has been pretty conclusively shown that their presence is limited to this disease, that numerically they increase and decrease with the rise and fall of the influenza, that they disappear with the cessation of the fever and the disease, and that by inoculation with them the influenza may be reproduced. These micro-organisms are of the breadth and one-half the length of the septicæmia bacillus; they occur in immobile, hanging drops which never coalesce (Kitasato). Of late they have been found in the blood (Canon).

The conditions upon which depends an outbreak of the disease are wholly unknown. It is quite likely that the infectious principle is carried by the air, and is thus brought in contact with the respiratory mucous membrane. That this infectious principle is exceedingly virulent is amply proved by the fact that no age, sex, race or condition seems exempt from its

action. It is reasonable to presume that sporadic cases occur; but the disease soon becomes epidemic, following the lines of travel and spreading over vast territories in an incredibly short period of time. It is still an open question to what extent influenza is contagious; that it can be carried in clothing, fomites, etc., is generally admitted. Predisposing causes can hardly be said to exist save that bodily weakness, by lessening the powers of resistance, may here, as elsewhere, come under this head. But men and women, old and young, alike fall easy victims to this swiftly moving and intensely active agent; children of less than one year of age, it is claimed, are somewhat exempt, yet cases are on record of sucklings only a few days old, dying with unmistakable symptoms of the epidemic. Local conditions, character of soil, etc., seem to have no bearing upon the ætiology of the affection; in fact, the high seas are not exempt from its ravages, as is shown from the experience of vessels that were obliged to put back to port because the crew, well when shipping, were disabled from work by a violent attack and rendered helpless by this disease.

Symptomatology.—The onset of the disease, in a great majority of cases, is quite sudden. A moderate chill is followed by active fever and symptoms of catarrhal involvement, with, at first, dryness and swelling of the mucous membrane, which later secretes abundantly. There is great prostration, quite as noticeable in the strong and robust as in the feeble, and markedly affecting the circulatory apparatus, giving rise to a quick, weak pulse. Severe headache, with pain in the eyes, worse from motion; sore, bruised, beaten feeling all over, with heavy aching and pain in the extremities, loins, and back; these pains are persistent and hard, and the severity of the backache here is greater than in any acute disease save dengue and small-pox. The temperature in the average case runs from 101° to 103°; it rises and falls in proportion to the severity of accompanying constitutional symptoms. In light cases slight evening exacerbations are noted, while in severe cases the temperature rises quickly and remains at its maximum for a period ranging usually from four to seven days. The fever, in the milder type, terminates by crisis; in the more serious cases, by lysis.

The prominence of certain groups of local symptoms constantly modifies the picture here presented. Thus, often, and

especially in children, symptoms of *gastro-intestinal* catarrhal irritation are well pronounced, and then nausea and vomiting are present from the beginning of the disease. The tongue is flabby, thickly coated, and shows the indentations of the teeth; there is loss of appetite; vomiting and diarrhoea may become so persistent and exhausting as to resemble a severe attack of cholera infantum. Particularly in young children symptoms of collapse appear, with sunken eyes, depressed fontanelles, great restlessness, and death. In exceptional cases there is constipation.

Again, the *nervous* symptoms may be prominent and severe headache, with symptoms of meningeal irritation, be present; the latter symptoms are often seen in cases of influenza-pneumonia. In this type of the disease the rheumatoid pains in the back, loins and extremities are especially severe, accompanied by a sense of great weakness in the affected parts, without appreciable swelling. Not infrequently the prostration becomes so pronounced that the general condition closely resembles the typhoid state. Drowsiness, at times strikingly persistent, has been noted. Earl (Starr's American Text-book of Diseases of Children) mentions irritability and fretfulness as commonly present in children who suffer from this type of influenza, and he emphasizes the occasional occurrence "of an obstinacy which is truly remarkable; they sometimes resist the slightest touch, and refuse all examination on part of the physician." Convulsions may occur, but are infrequent.

Much oftener, however, does the brunt of the disease fall upon the *respiratory* mucous membrane. A general catarrh of the respiratory organs may develop rapidly, with redness and suffusion of the eyes, catarrh of the middle ear, and painful paroxysms of cough, accompanied by oppressed breathing, expectoration of scanty and tenacious mucus, and sharp lancinating pains in the chest, particularly in the substernal region. Slight fever, with moist, yellowish coated tongue, considerable thirst, headache, sleeplessness, great exhaustion, cardiac weakness, and profuse sweating are the accompanying constitutional symptoms. The general capillary bronchitis thus developing is always bilateral; pneumonia frequently complicates it, either from the very beginning of the chest-trouble, or it develops insidiously during the progress of the disease, or makes its ap-

pearance suddenly, and usually unexpectedly, during a seemingly satisfactory convalescence, often in light cases.

The prominence of these local symptoms has given rise to a classification of the various types of influenza, and writers recognize a thoracic, gastro-intestinal, nervous or typhoid form of the disease; in many cases, however, a strict classification is found impracticable because the symptoms shade from one form into the other.

Recovery is often tardy, and frequent relapses are common.

Complications and Sequelæ.—The complications which may arise during an attack of influenza are numerous and serious; among these, affections of the respiratory organs are conspicuous. Bronchitis, involving the large bronchi or extending into the small ramifications, is common; it is very dangerous to old people and to persons already exhausted from previous ill health; there is a tendency to pulmonary œdema, heart failure, or progressive cyanosis; broncho-pneumonia also may result.

Pneumonia, catarrhal or croupous, occurs, and during the last epidemic, from 1889 to '92, it greatly increased the death-rate. In some cases the symptoms of acute, violent infection are at first most pronounced, accompanied with high fever and very pronounced dyspnœa, the signs of pneumonia declaring themselves in three or four days, usually with slight cough and scanty expectoration. In other cases the pneumonia seems due to the profound depression of the nervous system; this applies especially to the form observed in the aged and in feeble persons or young children. It is safe to state that the tendency to pneumonia is well pronounced, and many cases have been put on record which show that very slight exposure in persons but little inconvenienced, on account of the mildness of the attack of influenza, proved sufficient to cause fatal pneumonia. Pepper found pneumonia in 4 per cent. of the 35,413 cases collected by him, with a mortality of 11.65 per cent.; many of these were characterized by great feebleness of the respiratory murmur, typhoid tendency, cardiac weakness, involvement of both lungs, intense abdominal engorgement, with jaundice and slight intestinal hæmorrhage. The serious character of the pulmonary affection is also shown by the frequency with which plastic pleurisy, empyema, purulent pericarditis and, indirectly, pulmonary phthisis result. The latter, as in the case of albu-

minuria, depends upon an existing latent tendency, and yields a high rate of mortality. Important complications affect the nervous system. A pseudo-cerebro-spinal meningitis, closely resembling the true spotted fever, and differentiated from it chiefly by the absence of petechiæ, has been described; it may prove fatal from the severity of the acute symptoms or, in the subacute form, from exudation and resulting pressure. Peripheral neuritis, with atrophy and partial paralysis, neuralgia, insanity, and abscess of the brain, occur less often.

When it is borne in mind that influenza, by the remarkable depression of the nervous system which constitutes one of its most striking features, is likely to develop any latent tendency to morbid action, it is readily understood that the sequels of this disease must be exceedingly varied; thus, in addition to those already described, we find various affections of the eye (as keratitis), diseases of the ear (as purulent otitis media), nephritis (usually mild), numerous affections of the skin (herpes labialis, urticaria, roseola, furuncles which may prove both painful and persistent), chronic intestinal catarrh, glandular swellings with suppuration, dropsical conditions, rheumatism, chorea, etc. In fact, the list of these sequelæ is constantly increasing as the disease is more thoroughly studied and the results of individual experience compared and tabulated.

Diagnosis.—In the presence of an epidemic, and in the ordinary form of the disease, a correct diagnosis is easily made. The suddenness of the attack; the myalgic pains, especially in the loins and back; the marked character of the catarrhal symptoms, with the absence of the usual causes of bronchitis; the profound prostration, quite out of proportion to the height of the fever, these are usually sufficient to establish the diagnosis.

Cerebro-spinal meningitis closely resembles certain cases of influenza, and a positive diagnosis may be difficult or impossible. In influenza the absence of the petechial eruption and the presence of catarrhal symptoms must be duly considered; there is also less rigidity of the muscles than in spotted fever; but often the resemblance is so close that a bacteriological examination alone can positively determine the nature of the disease. From *typhoid fever*: the early predominance of catarrhal symptoms, the suddenness of the onset, the absence of

the characteristic eruption, of abdominal tenderness and of splenic enlargement; the irregularity of the fever, in such sharp contrast to that of typhoid, are usually sufficient to differentiate even in those cases which by their tendency to a "low" state, haggard countenance, intestinal catarrh, etc., suggest a continued or typhoid fever. The diagnosis from *simple catarrh* should present no difficulty save in exceptionally light cases; prudence suggests that during the prevalence of an epidemic all patients presenting symptoms which point to "La Grippe" should be kept under close observation.

Prognosis.—The seriousness of a case of influenza is measured by the gravity of existing complications. Uncomplicated, and in a person of average vigor, its death rate is but a small fraction of one per cent., from one-fourth to one-half of one per cent. In those enfeebled by old age or by some previously existing malady, a guarded prognosis is to be given. The existence of pulmonary, cardiac, or renal disease, of chronic nervous affections, or a lack of normal vitality, greatly predispose to an unfavorable issue; the occurrence of grave complications, such as pneumonia, always gives to the case a serious aspect. Again, even though recovery may take place, the sequels, such as pulmonary phthisis, are to be dreaded. As stated, the disease has a tendency to favor the development of affections which may have lain dormant for years, and it thus greatly and unfavorably affects the rate of mortality in a community during and after the visitation of an epidemic.

Treatment.—No means of prevention are known. Goldschmidt and Althaus advise revaccination with animal lymph, but their recommendation is not based upon grounds that commend it to the profession. In view of the universal liability to the infection, good sense suggests that during the prevalence of an epidemic especial care should be had to avoid taking cold and to husband physical energy. Hence, exposure to draughts or wet, carelessness in clothing, sudden checking of perspiration, excesses of any kind, overwork, in fact, anything that taxes the vital forces, should be scrupulously avoided.

Once ill, complete rest in bed until the patient has become fully convalescent is of the utmost importance; neglect of this rule has proved disastrous in many cases. The temperature of the sick room is to be kept even and moderate, and draughts are to be carefully excluded.

Cheerfulness of surroundings, diligence in guarding against danger of taking cold and in avoiding all useless waste of energy, a supporting diet, and an abundance of sleep constitute the most important features of general treatment. Purgatives, opiates, and routine antipyretics are to be avoided as useless and even dangerous. PHENACETINE, in doses of three to five grains, repeated two or three times in the twenty-four hours, is said to reduce the temperature, relieve pain, and afford sleep. The authorities of the dominant school commend its use, and E. M. Hale speaks highly of it; I have no experience with it. Whittaker states that SALIPYRIN, 10 to 15 grs. every two to four hours, is almost a specific.

During convalescence, care must be taken to avoid exposure and subsequent relapse. Freedom from anxiety and worry, and a complete change of surroundings, with protracted residence in a mild, even climate, will be found highly beneficial. At almost any period the moderate use of stimulants may become a necessity; if so, champagne will prove especially grateful and helpful to old people and children.

Therapeutics.—ACONITE. The catarrhal fever is high and presents the characteristic restlessness, thirst, full and quick, hard pulse-beat, hot skin, glowing face, etc., of the remedy. Dryness and irritation of the upper air-passages; hoarseness, dry cough.—GELSEMIUM has proved one of our best remedies in the uncomplicated form. It has shivering, fever, great weariness and depression, extreme languor. Heat in the head, with watery discharge from the nose, sneezing, dull headache, dizziness, rawness and burning in the larynx. Considerable aching all over; at times myalgic pains are very severe; so "used up" that he feels sure a long and serious illness is upon him. The remedy has done its best work for me when given in fractional doses of the mother tincture, every one or two hours.—EUPATORIUM PERFOLIATUM. The catarrhal symptoms are overshadowed by the severity of the pains in the extremities and back, which are of a "bone-breaking" character. Nausea, biliousness, vomiting of bile. Weak pulse; great prostration.—ARSENICUM IODATUM. The catarrhal symptoms are intense, affecting especially the eyes, nose and throat. Discharges acrid, irritating. Shivering; hot, dry skin. Great prostration, so that even a slight exertion is followed by complete exhaus-

tion. Characteristic restlessness and thirst. Desire for artificial warmth. Presentiment of a fatal issue of the illness. Later, great difficulty of breathing, with coldness, cold sweating, fatiguing, shaking cough; expectoration of tough, viscid sputum. Suited to enfeebled, old people.—SANGUINARIA. Fluent coryza, with dryness and heat in the throat, burning in the pharynx and œsophagus.—ALLIUM CEPA. Profuse discharge from eyes and nose; soreness and dryness of the throat; supra-orbital and occipital headache of dull, pressing character; dry, racking cough.—KALI BICHROMICUM. Fluent coryza, acrid, excoriating; heat and dryness of the eyes; pharyngeal involvement, dark red, puffy, with cough, accompanied with pain from the midsternum to the back, and expectoration of tough, stringy mucus.—MERCURY. Catarrhal symptoms very persistent; involvement of the middle ear; shiverings, alternating with flashes of heat; copious sweatings at night; discharges are muco-purulent; nose excoriated; eye-lids sore.

In case severe complications in the form of bronchitis or pneumonia develop, the remedies indicated under these headings must be exhibited. BRYONIA, PHOSPHORUS and TARTAR EMETIC are especially useful.—BRYONIA: Bronchitis; tickling in the throat; explosive, tearing cough as if the chest and head would fly to pieces; great prostration; sharp, cutting, pleuritic pains.—PHOSPHORUS. Great weakness and prostration; bronchopneumonia; hoarseness; dry, tearing cough; oppression in the chest.—TARTAR EMETIC. Great depression. Tendency to short periods of nausea and faintness. Dyspnœa, hoarseness, shivering, fever and sweating at irregular intervals. Later, large mucous râles; moist, loose cough, with much rattling of mucus in the throat and bronchi, but comparatively scanty expectoration.

When myalgic pains are marked, or the patient complains of "rheumatism," ACTÆA, CIMICIFUGA, BRYONIA or RHUS TOXICODENDRON, indicated by their characteristic symptoms, frequently relieve. PHYTOLACCA, also, is useful when the lumbar region is particularly painful and when the pain is streaking up and down the spine. Hale recommends MANACA when there is a sensation in the head and joints "as if bound tightly by an iron band;" he adds a teaspoonful to a glass of water, giving a teaspoonful of the solution every half hour.

PULSATILLA, CHELIDONIUM, MERCURIUS, ANTIMONIUM CRUDUM are indicated when gastric or bilious symptoms are pronounced. Special irritation of the nervous system may suggest CIMICIFUGA, BELLADONNA, HYOSCYAMUS, STRAMONIUM, OPIUM, BRYONIA, BAPTISIA.

Gisevius, of Berlin, recapitulating the experiences gathered during the epidemics of 1889 to '90 and 1890 to '91, speaks highly of CHINA 1x, which he used for very great weakness and exhausting sweats. The patients resemble those who are recovering from a severe attack of illness; are in a state of great mental and physical depression. Vertigo and fainting, aggravated on leaving the bed. Sleep does not refresh; pulse weak and small; heart-beat feeble; substernal irritation. Larger bronchi filled with accumulation of mucus; anorexia, with bitter, insipid taste. Occasionally diarrhoea. "All writers admit the tediousness of this stage, which rapidly disappears under CHINA, every two or three hours."

EPIDEMIC PAROTITIS.—MUMPS.

Definition and Causation.—An acute infectious disease, characterized by inflammation and enlargement of the parotid glands, with tendency to involve the testes in males and the breasts, rarely the ovaries, in females. It is both endemic and epidemic, more often the latter. If endemic, it is usually so in large cities and prevails in certain restricted localities, as boarding schools, institutions or barracks; under such conditions it may become epidemic, ninety per cent. of the inmates of such places having been known to have the disease. Epidemics usually occur in the colder seasons of the year. No age or sex is exempt; but men are more liable to the disease than women, and the very young and quite old are rarely attacked. The disease is contagious, spreading from patient to patient; contamination of the atmosphere through expectorated matter spreads the contagion. Probably mumps originates in the mouth and the micro-organism which constitutes the essential factor is conveyed to the parotid gland through Steno's duct; the frequency of stomatitis or some form of sore mouth or throat in connection with parotitis gives an air of strong prob-

ability to this theory, which is further strengthened by the immunity of infancy and old age, Steno's duct in the former being too small, and in the latter too atrophied, to permit the entrance of noxious matter. (Soltman.) The age of preference is from two to ten years; among adults, soldiers furnish the larger number of sufferers. One attack confers immunity from others.

Symptoms.—The period of *incubation* covers from fourteen to twenty-one days and it is not characterized by any symptoms. The period of *invasion* is marked by shivering or chill, followed by moderate fever, the thermometer ranging from 100° to 101° , and only rarely from 102° to 104° . Malaise, headache and slight gastric derangement are often, but not always, present. Pain at the angle of the jaw, of varying degrees of intensity, gives warning of the development of the local affection, and soon a swelling a little below and in front of the ear, at first slight, but rapidly increasing, makes its appearance. This enlargement is one-sided and progresses so rapidly that within thirty-six to forty-eight hours it has passed forward in front of the ear and below it, extending down the neck, pushing the lobe of the ear upward, involving the entire side of the face, cheek and neck, and obliterating the natural outlines of the parts; occasionally it extends through all the tissues of the throat, and very commonly pushes the head to one side. While sometimes severe pain is experienced, in the larger number of cases suffering results chiefly from the feeling of tightness and tension in the parts and from the impossibility of opening the mouth for purposes of speech, drinking or eating. Every attempt to do so produces extreme discomfort, and gives rise to distortions of the face which to the beholder are extremely comical. In some cases, within two or three days from the appearance of the swelling, the other side of the face becomes involved and passes through the same process. The swelling itself is of a "doughy" consistency, though hard and firm if the enlargement is extreme.

The constitutional disturbances accompanying the swelling are usually slight. Stomatitis, with foulness of breath, is often present. At first the salivary secretion is quite scanty; later it becomes copious, and may thus prove a source of much annoyance to the patient. Earache, with hardness of hearing,

is also often noted. In the great majority of cases the disease runs a mild course, the enlargement subsides after seven or ten days, food and drink can again be taken, and recovery takes place rapidly, with almost assured immunity from relapse.

Exceptionally the symptoms are severe, and there is from an early stage not only high fever, but delirium and such marked prostration of the nervous system as to give rise to a well-pronounced "*typhoid*" type.

A tendency to inflammation of the testicle constitutes a striking feature of mumps. Orchitis may occur at any time, but more frequently appears after the intensity of morbid action in the parotid has exhausted itself. It is commonly unilateral, with a preference for the right side; it varies in severity, effusion occasionally extending into the tunica vaginalis; it is characterized by swelling and tenderness in the gland, sensation of weight and pain, the latter extending along the cord, and frequently vomiting and fever. Orchitis with mumps is rarely seen prior to puberty; it generally continues for three to five days, and then gradually passes away. In bad cases atrophy of the testicle may result.

If parotitis is double, the right testicle usually is affected; if unilateral, there is a preference for the testicle on the affected side; double orchitis is rare. In females, vulvo-vaginitis and a moderate mastitis take the place of orchitis in the male.

Complications.—In exceptional cases there is from the start very high fever, soon followed by delirium and symptoms indicating meningitis; the prognosis in these cases is serious; in a large proportion of the fatal cases, examination after death has shown the existence of meningitis.

Very occasionally acute mania and insanity have been observed. Arthritis, albuminuria, acute uræmia, and many complications so rare as to possess little, if any, practical interest to the practitioner, have been put on record. Some cases are followed by permanent deafness; others by certain affections of the eye, as amblyopia, stenosis of the lachrymal glands and conjunctivitis.

Suppuration of the parotid glands is fortunately very rare.

Secondary Parotitis.—It is proper here to call attention to the existence of a *secondary* or *metastatic* parotitis which may occur as a complication of any serious acute disease, such as

typhoid fever, typhus, phthisis, carcinoma, or injury to the abdominal or pelvic organs. Its symptoms are those of epidemic parotitis, save that the swelling is much greater and that there is pronounced tendency to suppuration. If suppuration takes place, the discharge is outward or into the external auditory meatus. Extensive sloughing and gangrene are common here, and such permanent injury as facial paralysis and deafness may result.

Diagnosis.—The rare occurrence of inflammation of the parotid gland, save in mumps, almost establishes the diagnosis in young patients. In older persons the nature of the swelling is such as to prevent difficulty in recognizing the cause. *Retropharyngeal abscess* would give rise to similar difficulty in opening the mouth, of swallowing, etc., but the appearance of the face and a digital examination would establish the diagnosis. An extensive *lymphangitis* might create doubt, but its location on the neck, the tediousness of its course, and its tendency to suppuration would determine the nature of the affection.

The Prognosis of non-complicated mumps is good.

Treatment.—The precaution of keeping the patient in bed is always justified; it is rendered doubly necessary when complications in the way of testicular, mammary, or ovarian involvement are threatening. Owing to the difficulty of swallowing, the diet will be wholly liquid, with a preference for milk; later, especially if anæmia threatens, more stimulating food must be used, and cod-liver oil, clear or in some combination, is indicated.

It is well to protect the swelling itself with cotton wool, covered with oiled silk. The use of an ointment containing fluid extract of Belladonna in vaseline or of a Belladonna glycerole is unobjectionable. If the swelling prove tedious, the local use of the tincture of Iodine or of Iodoform collodion (1:15) will prove serviceable. Of *suppuration*, there is practically no danger in the epidemic form. In the secondary form, or whenever danger of suppuration exists, poultices (flax-seed, bread and milk) may be employed as indicated, and as soon as fluctuation can be detected an incision must be made parallel to the line of important vessels and nerves, to avoid doing injury to these.

In *orchitis*, leeching (four to six leeches applied to the inner

border of the groin) has been recommended; absolute rest and support of the testicle by suspensory bandage are indispensable; in case of vulvo-vaginitis, use the hot douche; the inflamed mammae may require the local use of BELLADONNA ointment or glycerole and protection from the air by light compresses of cotton wool covered with oiled silk. If *meningitis* occurs, it must be treated according to its indications. (See chapter on Meningitis.)

Therapeutics.—ACONITE, when the fever is high and characteristic thirst and restlessness are present. Of service only in the stage of invasion.—BELLADONNA: The swelling is bright-red, radiating from the centre. Right-sided. Great heat of the body, particularly in the inflamed part. Sharp, stitching pains, or pain gradually increasing until it becomes unbearable, then stops, and reappears in the same manner. Dryness of the mouth. Tongue white, with red edges. Pulse full, hard. Cerebral congestion and symptoms of meningeal irritation or inflammation.—PULSATILLA: Chilliness, fever without thirst; intolerance of pain; pain now here, now there; swelling pale; cannot bear the close room. Thickly coated tongue, with dryness of the mouth and bad taste. Mammary involvement.—RHUS TOXICODENDRON. Swelling on the left side, dark-red; great restlessness; typhoid symptoms.—LACHESIS: Extension of the swelling from right to left; swelling hard, bluish, mottled; great depression; hardness of hearing; cannot bear the slightest touch about the throat or the inflamed gland; flushes of heat; sharp, lancinating pains in the inflamed gland, which changes to a *burning* pain when touched. Patient feels worst when awaking from sleep.—MERCURIUS IODATUS. Flabby tongue, showing indentation of the teeth; offensive breath from stomatitis; fever with alternating hot and cold spells; frequent copious sweating, especially at night, without relief of symptoms; salivation copious and stringy.—CONIUM: Swelling very hard; mammary and ovarian involvement; there is little pain in the enlarged gland, or it is of a *darting* character.

BROMINE is recommended when the discharge is excoriating; there is much heat in the gland, and marked hardness around the fistulous opening; scrofulous diathesis.

Consult also: LYCOPodium, BRYONIA, CARBO VEGET., COCCULUS, PHYTOLACCA, CALCAREA. When orchitis exists, AURUM,

PULSATILLA, ARNICA, CONIUM, and other remedies mentioned under appropriate headings will be in place.

In case there is suppuration, HEPAR SULPHUR. and AURUM will prove useful.

WHOOPING-COUGH.

(*Pertussis.—Tussis convulsiva.*)

General Definition and Causation.—Whooping cough is an acute infectious disease especially affecting the respiratory mucous membrane and giving rise to paroxysms of convulsive cough characterized by a long-drawn inspiratory effect during which the “whoop” is produced. It is epidemic, but sporadic cases occur; it appears chiefly in winter and spring. It is essentially a disease of childhood, preferably attacking children from six months to six years; after the tenth year, very slight susceptibility exists; yet, adults and old people may have it. In adults the attacks are usually light, save in the very aged, in whom the occurrence of the disease is quite rare, but dangerous, owing to their low powers of endurance. Females are somewhat oftener attacked than males (5 to 4), and suffer more severely. Anæmic children, or children who are subject to bronchial or nasal catarrh, or who have just recovered from measles, are particularly liable to the infection. According to the U. S. Census Report, the fatality of the disease is twice as great among the negroes as it is among the whites. One attack almost positively protects against future ill-effects from exposure.

The contagious element of tussis is probably contained in the sputum, and through its agency the disease is directly conveyed from person to person. The theory of the neurotic character of whooping cough has been generally abandoned, the presence of the marked nervous symptoms being explained upon the hypothesis that “pertussis is a mycosis whose toxins have a special action upon that part of the nervous system which presides over cough,—to wit, the centres of the superior laryngeal and vagus nerves.” (Whittaker.)

Symptomatology.—The period of incubation lasts from seven

to ten days. The disease proper begins with the *catarrhal stage*, which in no wise differs from any other catarrh involving the respiratory mucous membrane. There is coryza; the discharge from the nose and eyes is watery, copious; there is shivering, some fever, with usually moderate elevation of temperature, rarely more than 101° , and dry, frequent, hacking, bronchial cough, which gradually increases in frequency and severity, and in some cases within a few days betrays the convulsive tendency. In from seven to ten, or more, days the *convulsive* or *paroxysmal* stage begins, with the first well-defined, clear-cut paroxysm of coughing. The onset of this stage may be abrupt; oftener it is the reverse. The paroxysm itself begins with a series of sharp, dry, very hard coughs, following each other quickly, with rapidly increasing difficulty of breathing and distress, which is plainly expressed in the anxious, frightened expression of the child's face and in its eagerness to find comfort in the arms of mother or nurse. The cough frequently is interrupted by loud, shrill inspirations, the result of spasmodic closure of the glottis, and the paroxysm finally ceases with an intense deep inspiration, causing the loud "whoop" which has given the disease its name. These paroxysms occur both night and day; they are more frequent at night, and average from four or five to fifty, or more, seizures during the twenty-four hours.

During the cough, there are present symptoms which denote insufficient aëration of the blood; the face becomes dusky, the eye-balls protrude and become congested; the forehead, hands and body are covered with a cold sweat; the sphincters may relax; in fact, danger of suffocation seems imminent, when relief is suddenly had by the entrance of air into the lungs. The fits of coughing thus continue until there is expectoration or until there is thrown off by what seems a combined cough and vomiting a considerable amount of tenacious, glairy mucus, after which an interval of rest is had.

The stasis which marks these paroxysms may give rise to hæmorrhages, as into the conjunctiva, or to bleeding from the nose, ears, or into the brain; the violence of the concussion itself may cause rupture of the ear-drum or even hernia. The physical signs consist of a few moist râles and the signs which are peculiar to existing complications. The paroxysm over,

the little patient rests, then plays as usual until he is conscious of the approach of another fit, when the symptoms described again occur. The premonitory symptoms of an attack, from the statements of children old enough to express themselves intelligently, are either a tickling in the throat or a sense of constriction, of threatening suffocation. It is difficult to overlook the close resemblance of these seizures to affections of a purely neurotic origin. As Whittaker says: "It would appear as if the nerve centres suddenly discharged themselves of accumulated irritation, as in the case of epilepsy. Close observation of a case gives rise to the impression that the poison accumulates gradually up to a certain point, when it may be no longer stored and is discharged with the explosion that characterizes a paroxysm of the disease." If the premonitory symptoms described are looked upon in the light of an epileptic aura, the likeness is complete.

The attacks may be excited by anything that irritates the throat, as the inhalation of dust, laughing, crying, touching the throat, swallowing, etc. Moral causes may have the same effect; thus, anger or other violent emotions, or hearing another child cough, will bring on a paroxysm.

If the disease is violent, the general appearance of the child shows exhaustion; the eyelids are swollen; the skin is pale; the veins relaxed and blue; an ulcer is commonly seen under the tongue, which at one time was presumed to hold some ætiological relation to pertussis, but is probably the result of injury done the frænum during the paroxysms of coughing. There is no fever during this stage, except as toward evening a slight elevation of temperature (100° to 101°) may occur or arise from some existing complication.

A diminution in the number of paroxysms indicates approaching recovery; the seizures become lighter as well as less frequent, and in the course of three or four weeks from the beginning of the convulsive stage, sometimes not for as many months, the *stadium decrementi* commences, and the patient gradually gets well. Exacerbations and relapses, however, are by no means uncommon.

Complications and Sequelæ.—Among the minor complications the various hæmorrhagic effusions incidentally mentioned occur with considerable frequency; hæmoptysis is not unusual;

hæmorrhage from the bowels is rare. Convulsions from blood-pressure upon the brain are occasionally noted during the paroxysms, and permanent harm, such as monoplegia, hemiplegia and even death, may result in exceptional instances. Pleurisy, pneumonia, and interstitial emphysema are among the pulmonary complications which arise. Lobular pneumonia follows in the wake of severe bronchitis when it involves the finer bronchial ramifications; it is a very serious complication, runs a tedious course, and may terminate fatally, direct or from exhaustion and inanition. Croupous and diphtheritic inflammations of the pharynx and larynx, and not infrequently diarrhœa, are also observed.

Dilatation of the alveoli from the great pressure they are called upon to resist may produce acute or chronic emphysema. In children who are weakly, or badly nourished, or of tubercular predisposition, whooping cough not infrequently acts as the exciting cause of pronounced tubercular disease, and thus pulmonary tuberculosis is added to the list of serious sequelæ; this, in fact, so often occurs that great pains must be taken during the stage of convalescence with children whose history is in the slightest degree suspicious. Paralytic affections, from neuritis, are occasionally, but not often, noticed.

Diagnosis.—A positive diagnosis is impossible during the catarrhal stage. As the cough becomes more and more incessant, especially during epidemics of whooping cough, suspicion will be aroused; the convulsive stage having well developed, a mistake can not readily be made.

Prognosis.—The prognosis is good in uncomplicated cases; yet, complications are so frequent that pertussis is really a disease to be greatly dreaded in changeable, severe climates. The average rate of mortality is from 3 to 5 per cent.; it has reached 48 per cent. during the second year of life. It is safe to state that the younger the patient, the more serious the disease. Secondary pneumonia must always be looked upon as a grave complication.

The frequency of the paroxysms directly affects the prognosis; if more than fifty paroxysms occur during the twenty-four hours, the case is serious; if the number of seizures is more than sixty in the same length of time, the prognosis must be extremely guarded. Delicate, badly nourished children and the

very aged can offer comparatively slight resistance, and readily succumb where others recover.

Treatment.—Prophylaxis here practically means isolation of the patient in order to protect other members of the family. In view of the now generally accepted belief that the sputum contains the medium of direct communication of the disease, the handkerchief as a receptacle of the expectoration is not allowable, and a cuspidor or a basin containing water must be used for that purpose. Parents must be cautioned to keep from school or from association with other children those suspected of having the disease. If possible, in the case of city patients, the little one should be sent into the country; when that is impracticable, it should at least be supplied with an abundance of fresh, pure air. During the catarrhal stage, especially if the symptoms are at all severe, the child should be kept in bed. The atmosphere of the sick room must be slightly humid; to this end a basin of water should be kept on the stove. A spray of carbolized water, or sheets wrung out of carbolized water, hung up in the room, answers the same purpose. Drink may be given freely and an abundance of easily digested food be allowed; it is wise to see that dry, “crumbling” articles of food are kept from the child, since they may excite the cough.

Among the agencies used in severe cases for the relief of the irritation in the throat, a reasonably strong solution of Cocaine applied with a brush, or inhalations through the steam atomizer of vapor medicated with carbolic acid, deserve special mention. The latter particularly has proved of great service. If bronchitis develops, hot applications to the chest and hot baths are indicated.

Particular pains must be taken to prevent imprudence and exposure during convalescence, so as to avoid the development of sequelæ. If the attack has been long-continued and severe, the patient may for an indefinite length of time require constant and skilled medical care to insure perfect recovery; this applies most emphatically to children of tubercular predisposition.

Therapeutics.—**BELLADONNA** is especially useful in full-blooded, hearty children of nervous temperament. The cough is rough, barking, paroxysmal, excited by tickling in the larynx, and accompanied often by a sensation of “choking”

tightness in the throat. It is aggravated by talking, swallowing, deep inspiration, touch. It covers the catarrhal stage of many cases, when the discharge from the eyes and nose is hot, with flushed face, roaring and beating in the ears, dryness of the nose, dull frontal headache. White coating of the tongue, which at times is red on the edges. Dryness of the mouth, with foul, slimy taste in the mouth. Dryness of the larynx. Asthmatic feeling in the throat and chest, with cough from dryness in the larynx, from tickling-itching in the back part of the larynx. Cough with expectoration of a considerable quantity of tough mucus. Its applicability to spasmodic states is marked and the tendency to congestion so pronounced as to render it strictly homœopathic to many cases in the convulsive stage.—ANTIMONIUM TARTARICUM has proved of especial value when pulmonary complications existed. Given low, it favors free expectoration and is of great value when large mucus râles are present or when the involvement of the finer bronchi is extensive. In the early catarrhal stage it is of slight value. There is violent tickling in the windpipe, causing cough, worse after midnight; has to sit up on account of the oppression and dyspnœa; coughing-spell begins with suffocative feeling; crowing, gasping for air, finally relieved by copious mucous expectoration; cough after getting angry and provoked; large accumulation of mucus in the bronchial tubes, inhibiting the child from coughing; great prostration.—CUPRUM promises most in cases where the convulsive element is prominent. The paroxysms of coughing seem interminable and exceedingly distressing, threatening the patient with suffocation. They occur frequently and are excited by talking, eating solid food, by mucus in the trachea, cold air, in fact by anything that irritates the parts. The face is haggard and pale or cyanotic and sunken. There may be spasmodic rigidity of the entire body. Relief from drinking cold water is characteristic of CUPRUM. The constriction of the chest is usually well pronounced; froth gathers about the lips during the fit; the rattling of mucus in the chest is audible; expectoration is painfully difficult and may be accompanied with vomiting of bile and blood.—CORALLIUM RUBRUM was one of Teste's favorite remedies in tussis. It is best suited to children of a nervous temperament. The attacks of coughing, while frequent and

painful enough, are yet much less violent than under CUPRUM, and the convulsive feature is more localized; the seat of the spasmodic action is in the larynx and trachea; vomiting of mucus is not deferred as long as under CUPRUM.—IPECACUANHA is most useful during the latter part of the catarrhal stage. There is gastric uneasiness, with disposition to retch and vomit; aversion to food, due to constant, slight nausea; cutting and pinching pain in the abdomen with, at times, diarrhœic movements; peevishness and irritability of the patient. Rattling of mucus in the chest and throat, with frequent hard coughing and gagging and vomiting during the spells of coughing; the expectoration consists of flat-tasting, sweetish mucus, occasionally freely streaked with bright blood. There is much distress of breathing when coughing; the face becomes purple from the violent effort to cough and from the strangling; the patient is left greatly exhausted from the violence of the cough. Breathing sounds "asthmatic."—NAPHTHALINE has been used rather empirically, and at times with very satisfactory results.—HYOSCYAMUS, ANACARDIUM, ASAFÆTIDA, CERIUM OXAL., MOSCHUS, and others, are suggested by nervous symptoms peculiar to them; KALI BICHROM., SPONGIA, BRYONIA, DROSER, SAMBUCUS, KALI CARBON., and others, are called to mind by well-known peculiarities of the "cough" itself rather than any special similarity to the totality of symptoms presented by the typical case of pertussis.

Hale recommends, among others, Phenacetine, in doses of from 2 to 10 grs. of the first dec. trit., and of 3 to 5 grs. of the crude drug to adults, repeated every three to four hours.

I firmly believe that success in the treatment of whooping cough depends upon the intelligent selection of the homœopathically indicated remedy and pluck in continuing its exhibition so long as the symptoms of the case call for it. Lilienthal (Homœopathic Therapeutics) gives the indications of eighty-five remedies to which the reader is referred for further study.

CEREBRO-SPINAL MENINGITIS.

Synonyms: Epidemic Meningitis.—Meningeal Fever.—Petechial Fever.—Spotted Fever.—Malignant Fever.—Malignant Purpuric Fever.—Cerebral Typhus.

An acute infectious disease which occurs epidemically and sporadically, and manifests itself chiefly by the virulent action of the specific poison upon the cerebro-spinal meninges. It is characterized by suddenness of invasion, intense pain in the back of the neck and spine, tetanic rigidity and contraction of the muscular fibre, especially of the posterior muscles of the neck, hyperæsthesia, vomiting, lowered arterial tension, moderate elevation of temperature, great depression of the vital powers, the presence, usually, of herpetic or vesicular eruption, purpuric spots, or petechiæ, and the occurrence, nearly always, of coma before death. Convalescence is generally protracted and recovery incomplete.

Ætiology.—Spotted fever was first recognized and studied clinically during an epidemic which occurred at Geneva in 1805; it was first observed in the United States in 1806. It is an epidemic of rare frequency, but isolated sporadic cases are observed constantly in different localities. It is undoubtedly infectious, but as yet nothing positive is known concerning the specific virus which is its direct cause. Various micro-organisms have been found and described; of these, the pneumococcus, or a microbe closely resembling it, discovered in the meningeal exudation of persons dead from the disease, has attracted most attention. It is not known how the infectious principle gains entrance into the system. Neither has it been determined whether, or not, the disease is contagious. The fact that those who are in daily attendance upon persons ill with the fever do often wholly escape, and that frequently only isolated cases occur in large families, argues against its contagiousness or transmission by clothing or excreta. Yet, well authenticated cases have been placed on record where by contact with infected garments the fever was communicated to a number of persons living at a considerable distance from

the person originally infected and from each other, and in some cases brought in contact with the contaminated garments weeks and months after the first case had occurred. It seems also as though certain houses and localities may be infected, for in several instances the disease has appeared among the successive occupants of certain buildings (as barracks), the same parties, upon change of residence, remaining free from the infection.

The disease does not follow lines of travel, but appears unexpectedly in localities widely separated. Thus, the epidemic at Geneva in 1805 was followed in 1806 by outbreaks simultaneously in Germany and in the United States.

The disease has shown a decided preference for the northern portions of the temperate zone and for the cold seasons of the year, cases being most frequent and especially severe during the winter months. It appears from statistics that its victims usually are the young. With the exception of soldiers, who among adults are particularly liable to the disease, cerebrospinal meningitis most readily attacks children and young people from the fifth to the sixteenth year; it has proved especially fatal in infants less than one year old (Report of the N. Y. Board of Health).

Wolff, from an analysis of 132 cases, concludes that moisture of air and soil constitutes a predisposing cause. Insanitary surroundings, filth, and overcrowding of population have no influence, for localities free from these objections have furnished many marked cases, while filthy and overcrowded districts of large cities, like London and New York, have remained free. Fatigue, exposure, low state of vitality from previous illness, etc., can be considered only in the broadest sense and, like race, sex or age, have no direct bearing upon the question.

Morbid Anatomy.—Rigor mortis is marked and decomposition sets in early. The principal changes are in the brain and spinal cord and their coverings, consisting of great hyperæmia, inflammation, inflammatory products, and structural changes. The hyperæmia is general, involving the vessels, sinuses and covering membranes of the brain and cord. The dura mater adheres to the arachnoid, and effusion of serum, sometimes of pus, is found between the two. The pia mater in severe cases shows exudation and infiltration into and within its meshes.

Pus is found in the fissures; the entire surface of the brain may be bathed in pus. The pia mater often firmly adheres, in spots, to the brain, which shows hæmorrhagic spots and more or less extensive areas of softening. Corresponding changes are noted in the spine. Both cranial and spinal nerves, especially the auditory and the optic, are deeply involved, with exudation along their lymphatic sheaths and pus bathing their roots. Neuritis and perineuritis are common.

The muscles are dry, pale; sometimes granular degeneration is present. The heart is flabby, and the blood, in malignant cases, fluid. There is hypostatic congestion of the lungs and pneumonia. Congestion of liver and kidneys, at times nephritis. Enlargement of the spleen, in proportion to the intensity and duration of the fever. Extensive ecchymoses; dusky, mottled appearance of the internal organs.

Symptomatology.—In the average case the onset of the disease is sudden. If there is a prodromal stage, it lasts from several hours to several days, and presents no characteristics, being simply a state of general depression and malaise. Usually, a hard chill appears between noon and midnight, with severe headache, dizziness, vomiting, pale face, expressive of much suffering, slight fever and full, rather heavy, pulse. In children convulsions often are present from the beginning. The headache commonly is frontal, sometimes occipital, very severe, lancinating, constant or intermitting. There is sensitiveness to light and noise, with irritability and restlessness. In children, delirium, often wild, is a common and early symptom. On the second or third day symptoms of spinal irritation show themselves, with stiffness and pain of the muscles of the neck and back, retraction of the head, and opisthotonos. Severe sharp pain in the muscles of the spine and extremities follows, with tonic spasms giving rise to intense suffering. The convulsive tendency becomes more and more pronounced, even involving the muscles of the face, not infrequently, especially in children, assuming an epileptiform type, with unconsciousness, and giving rise to local paralysis, as of the muscles of the face and eyes. Strabismus, inequality, dilatation or contraction of the pupils, with insensibility to light, are present. With these, there is vertigo, ringing in the ears, hypersensitiveness of special senses, general and remarkable hyperæsthesia all over the

body, delirium, which at times alternates with stupor, and temporary, sometimes permanent, loss of hearing and vision. Vomiting may prove persistent and distressing. There is no taste or appetite and usually no thirst. Constipation, rarely diarrhœa. Slightly increased flow of (albuminous) urine. Enlargement of the spleen.

The fever is variable, sometimes quite high, but generally moderate if the intensity of the general symptoms is considered; it presents no characteristic temperature curve. The pulse rate also is less affected than would be expected from the violence of the constitutional symptoms. Breathing often is "sighing," a slow, labored inspiration, followed by quick expiration and a long pause. An eruption commonly appears, varying from fever blisters about the mouth and lips to a general rash which may resemble that of measles, scarlet fever, or typhus, or appear blotch-like, petechial or ecchymotic.

In five to eight days from the declaration of the attack, a gradual and increasing amelioration of the symptoms shows itself, and the patient drifts into a state of convalescence which is modified by the severity of the attack and the appearance or non-appearance of complications and sequelæ.

If, on the other hand, the tendency is toward a fatal issue, a state of exhaustion follows the continuous excitement which has so far existed. The patient drops into a typhoid condition; the tongue becomes dry, red, brown and sooty; thirst is constant, though not often intense; the bowels are stubbornly constipated or diarrhœa supervenes; then follow tremulous restlessness, extreme exhaustion, rapid and light pulse, continuously sustained high temperature, coma, paralysis of the sphincters, and finally, sometimes after weeks and even months, death from asphyxia or exhaustion.

Cases occur in which the symptoms are limited to moderate headache, with vertigo, nausea, slight, if any, fever, and little, if any, pain and stiffness in the neck and back. Although cases of this type may suddenly assume a serious aspect, they usually recover within a few days. This is the *mild* form of the disease.

In others the onset may be typically sudden and violent, but in a few days a change for the better takes place and a quick recovery results. In these cases, as Pepper remarks, the initial

constitutional infection is pronounced, but the other essential constituent of the disease, the meningeal inflammation, is present in a very light measure. This is the *abortive* form.

Again, marked intermissions may be observed, daily or every other day, exacerbation of all the symptoms being followed by a temporary and pronounced subsidence; these intermissions are somewhat irregular, unlike those of malarial origin; they may occur at the beginning or toward the close of the disease, and are oftenest seen in moderately severe but tedious cases. This is called the *intermittent* form.

Or the onset of the disease may be exceedingly sudden and the symptoms of very great violence from the start, the patient passing rapidly into a state of collapse. Here the action of the specific poison upon the nerve centres is shown by even more than usual intensity of the headache, excessive prostration, feeble and thread-like pulse, subnormal temperature, coldness and clamminess of the skin, cyanosis, slow and labored respiration, delirium rapidly tending to coma, scanty, albuminous urine, and purpuric, ecchymotic eruption. Violent convulsions are rarely present. Such cases tend toward a fatal issue in five to twenty-four hours; if reaction takes place, recovery is sure to be very tedious and rarely complete. This is the *fulminant* form.

Special Symptoms.—The *cephalgia* is always present, save when the intensity of the specific poison has overcome all sensibility; it is expressed by corrugation of the eyebrows and frequent raising of the hand to the head. It probably arises from mechanical pressure upon the cranial and upper spinal ganglia. The *spinal pains* also are intense; they may extend throughout the cord, but oftener are limited to the cervical portion; they are neuralgic, darting, pricking, lightning-like, and may be accompanied by a sensation of numbness. The pain in the back is of a “dragging” character; involuntary effort to gain relief is undoubtedly in part responsible for the characteristic bending backward of the head. *Cutaneous hyperæsthesia* is pronounced; it may eventually give way to numbness and anæsthesia. *Convulsions* are more frequent and earlier in children than in adults, and may affect any or all the muscles. Exhaustion of energy and *paralysis* eventually result from their violence. General paralysis indicates a fatal termination.

Eye. The symptoms here are mainly due to cerebral involvement, in part directly to the disturbance of the muscular apparatus. In protracted and severe cases permanent harm may result from inflammation of the cornea and iris, the former ending in opacity or ulceration, the latter in effusion of lymph or pus. *Hearing* is often permanently injured or lost as the result of purulent inflammation of the labyrinth, suppurative inflammation of the middle ear, or of auditory nerve-atrophy. *Vertigo* is of cerebral origin; it is aggravated from attempts to arise from a recumbent posture; it is accompanied with nausea, faintness, quickened pulse, staggering gait, and tendency to fall to the ground when attempting to stand or walk. Children especially suffer from it, even after convalescence has been well established. *Organs of digestion.* Vomiting is chiefly of cerebral origin; thirst is rarely marked; in the fulminant form coffee-colored masses may be vomited in large quantities; constipation usually exists, but diarrhœa may prevail, especially in grave cases; the tongue at first is clean and moist; later it has a thick, whitish coating, especially in the centre and at the tip and edges; in the typhoid form it is dry, red, rough, parched, cracked. The *urine* generally is normal, slightly increased in amount; retention may occur during coma; albumin, casts and blood corpuscles are seen in serious cases. The *pulse* at the beginning of an attack may drop as low as forty beats per minute, and even lower, later rising considerably above normal, as 120 to 130. It is a soft, rather unsettled pulse, increased, even doubled, from slight exertion, as raising from a recumbent posture. The *temperature* has no characteristic curve; it is somewhat higher than normal in the axilla, varying from 100° to 103°. It often fluctuates without appreciable cause; sudden rise or fall indicates danger. The *eruption* is exceedingly variable; not infrequently it is wholly wanting; in others it is an exanthem indicating a depraved state of the blood rather than a characteristic lesion. The name "spotted fever" is derived from the dark, purplish, mottled appearance of the skin and internal organs which pertains to the grave type of the disease; these spots are oval in shape, and from one-third to one-half of an inch in their longest diameter. Herpes labialis, simple erythema, dermatitis, miliary, herpetic, vesicular eruptions, petechiæ and ecchymoses are seen in different cases, types, and epidemics.

The duration of the disease varies from a few hours to a few days in the fulminant form, and from days to months in complicated cases. The average duration is from twenty-four to thirty days.

Complications and Sequelæ.—The complications most likely to arise are those of the respiratory organs, chiefly pneumonia; also pleurisy, bronchitis, atelectasis, endocarditis, pericarditis. Intestinal catarrh and (parenchymatous) changes in the liver and kidneys, measles, scarlet fever, typhoid fever, cholera and malarial fever must also be mentioned. Among the sequelæ, deafness and blindness are common, especially the former, as proved by the reports of asylums. Paralytic affections, resulting from neuritis and perineuritis, are frequent; they usually recover in the course of several months. Speech may become permanently injured; severe headaches may persist for an indefinite length of time; mental feebleness may result, and an unmanageable form of hydrocephalus may develop in children. Relapses occur so often that a "chronic form" of the disease has been described.

Termination.—The termination of the disease is toward perfect recovery, imperfect recovery, or death. Imperfect recovery is frequent on account of the complex nature of the cases and the tendency to serious sequels which depends upon the profound exhaustion of the vital forces and the structural changes which are incidental to the affection. These factors also affect the death rate. In children the prognosis is always grave.

Uræmia, persistent low typhoid state, prolonged high fever, great blood dyscrasia, sudden and great rise or sudden fall of the temperature point toward an unfavorable prognosis.

In epidemics the rate of mortality is from 20 to 80 per cent. The highest rate of mortality usually occurs in the early part of an epidemic.

Diagnosis.—In the absence of an epidemic and of pathognomonic symptoms (eruption, characteristic pain and stiffness in back and neck, headache, hyperæsthesia, etc.) it may be difficult to recognize a mild, sporadic case. During an epidemic, and when the disease is well pronounced, there should be no difficulty. *Tubercular meningitis* is not influenced by the season of the year; there is usually evidence of an inherited tubercular tendency. The onset is gradual and the prodromal stage prolonged;

the course of the disease is more tedious, and the termination always fatal; the pulse is much more irregular; there is less spinal irritation, less retraction of the head, less pain in the extremities, and much less hyperæsthesia. The "sighing respiration" is more marked. The ophthalmoscope proves the presence of tubercle in the choroid.—*Typhoid fever* with cerebral involvement may closely resemble cerebro-spinal meningitis; but it lacks the decided preference for early youth, is slower in onset, presents no spasms, has a characteristic temperature curve, characteristic eruption, abdominal tenderness, diarrhœa, and much greater enlargement of the spleen.—*Typhus fever* is contagious and is limited to certain exposed localities, as seaports. It has a preference for adults; a high initial fever with characteristic temperature curve and distinct eruption, first roseolous, then petechial; its headache, usually, is dull; delirium occurs late, and is "muttering;" vomiting and convulsions are not so frequent as in spotted fever; there is much less pain and muscular rigidity. Distinct "mousy" odor of the body.—*Pernicious malarial fever* occurs in favored regions and seasons of the year; it has a well-defined ætiology. Although it rapidly develops collapse and coma, the first paroxysm is rarely fatal. There is greater splenic enlargement; presence of malarial organisms in the blood; prompt and specific action of quinine.—*Influenza* with meningeal involvement may so closely resemble cerebro-spinal fever, even to the sequelæ, that a positive differentiation is not always possible.—*Malignant scarlet fever* is determined by the presence of characteristic throat symptoms, by the *early* appearance of the specific rash, with desquamation and itching. In case of death before the appearance of the eruption a positive diagnosis may be out of the question.—*Rheumatic fever* without articular involvement and with trismus, great muscular soreness and rigidity, and with meningeal irritation, and *smallpox* of the malignant form, terminating fatally before the occurrence of the eruption, may present symptoms which make a clear diagnosis impossible.—*Secondary meningitis* also presents difficulties; the history of the case, the comparative lightness of the hyperæsthesia and of the stiffness of the muscles of the neck and back must be taken into consideration.

Treatment.—Prophylaxis is almost out of question; yet, in view of the bad effect which insanitary surroundings exert under

all circumstances upon the well no less than upon the sick, it is wise to take especial pains in the presence of a threatened epidemic of this, or any other, disease, and to strictly enforce sanitary regulations, as applied to public and private property and to persons. Fatigue and exposure should be avoided. A case having appeared in a house, the building should, if possible, be vacated at once by the inmates not yet affected; linen, clothing, and everything at all likely to transmit the disease, should be thoroughly disinfected or destroyed.

The patient should be placed into a large room, as far removed from noise as possible; the room must be well ventilated and kept at a temperature of about 65°; curtains should be in place, so as to exclude light when desirable. Particular pains are to be taken to insure quiet and to so arrange the work about the sick-room that there is about it no "fussing"; no superfluous attendant is to be allowed about the sick. From first to last every care must be exercised to avoid the slightest unnecessary exertion on part of the patient; so pernicious in its effects is moving about, that the linen should not be changed oftener than absolutely necessary, and an uncomfortable position of the patient is to be considered preferable, for a short time, to a change which involves exertion, waste of energy, and often considerable pain. If the patient is delirious or hypersensitive to external impressions, the room must be kept moderately dark.

For the relief of the *headache*, hot mustard foot-baths are recommended; they afford relief by drawing the blood from the head. General bleeding is now rarely practiced, but local bleeding, by leeches behind the ear, or by wet cupping, is still advocated; dry cupping has the same effects, and saves the loss of blood. The practice of placing ice-caps to the head, or ice-bags or ice in rubber tubes to the spine, has earnest advocates. Blistering, once very popular, is now rarely employed; the Paquelin thermo-cautery is recommended when counter-irritation along the spine and back seems necessary. Hot water baths are useful when the temperature ranges above 102.5°. Sponging in hot water is almost invariably grateful to the patient; it relieves the restlessness and the pain.

Phenacetine, in small and frequent doses, has been given to relieve the pain; its depressing effect renders caution in its use

necessary. Mercury and Quinine have proved useless. Opium in large doses, one grain every hour in severe, and every two hours in lighter, cases constitutes the sheet anchor of the dominant school; it must be prescribed cautiously in children.

The *diet* should be nutritious throughout, first liquid, later solid. Milk, broths, scraped raw beef, eggs, sweet-breads, fowl, etc., constitute the staples of an appropriate dietary. Overfeeding must, for obvious reasons, be avoided. If at any time feeding by the mouth becomes difficult, rectal alimentation or feeding by the stomach-pump is indicated. Water may be drunk as the patient desires.

Stimulants are borne kindly and in large amounts. Whenever exhaustion becomes apparent, they may be prescribed. Brandy and whiskey are to be used when the heart flags.

Constipation rarely becomes troublesome; if it does, castor-oil in proper doses is preferable to enemata, for the latter exhaust the patient. *Retention of urine* calls for the use of the soft catheter. If *vomiting* is persistent, small bits of ice, cooled champagne, milk and lime-water, or sips of very hot water, may give relief. Persistent *hiccough*, if it fails to yield to the indicated remedy, may demand the subcutaneous use of Morphine.

During convalescence extreme care must be exercised to prevent relapse. Judicious feeding and well regulated exercise are important. The electric current, effusions of cold and hot water to the spine, or alternating streams of cold and hot water, as well as massage, will prove efficient in overcoming the weakness and paralysis of affected nerve trunks.

Therapeutics.—GELSEMIUM: In the light, mild form it acts especially well on children and sensitive, nervous persons. There is chilliness, moderate fever, great general lassitude and weakness in the legs, dull heavy headache, dizziness, stupid expression of the face; "wants to be let alone;" rheumatic and myalgic pains in different parts of the body; symptoms of a malarial character.—AGARICUS: Stupefaction and vertigo, as if the brain were in a whirl. Stitches through the brain as if he were to lose his senses. Burning at the vertex, with stupefaction and vertigo. Painful pressure in the head and eyes. Tearing pain in various parts of the body; in the sacrum, as if it would fly to pieces. Digging aching in the posterior cervical

region. Muscular twitchings at the left knee, arm, back, etc. Twitching of the eyelids, eyeballs, and facial muscles. Shock of the entire body, the arm being jerked downward. Fainting-turns, with inclination to vomit. Stinging burning pains deep in the vertical column. Pain in the eyeball; weakness of sight. Buzzing and puffing sensation in the ears. Paralysis of arms and legs. Vesicular eruption of the size of millet seeds.—**CICUTA**: Countenance ashy, bluish-pale, cold; pupils dilated, insensible; jerking of the eyeballs and spasmodic contortions of the facial muscles; teeth are set, and there is inability to swallow. Violent occipital headache, severe vertigo, reeling on stooping. Violent hiccough. Tetanic rigidity of the muscles of the neck, with retraction of the head. Dumbness and deafness. Excessive dyspnoea from tonic spasm of the muscles of the chest. Trembling of the limbs; startings and convulsive movements of the limbs; convulsions with violent outcries, suspension of breathing and foaming at the mouth. Violent jerks through the head, arms, and legs. Tonic spasms, renewed from the slightest touch. Opisthotonos.—**NUX**: Terrible ache in the occiput, which feels sore and bruised from stitching, lancing pains which fly through the body with the swiftness and fierceness of chain-lightning, and from violent convulsions, without loss of consciousness, excited by the least touch. Tearing pain in the nape of the neck and in the back; drawing, jerking pains from the orbit to the occiput. Great hyperæsthesia.—**CIMICIFUGA**: Intense pain in the head, particularly at its base and along the spine; great sensitiveness of the spine; rigidity of the muscles of the neck and back, with retention. The brain feels too large. Marked sensitiveness of the skin, with circumscribed or diffused muscular soreness. Sleeplessness. Alternate tonic and clonic spasms, night and day. Pain in the back, of a drawing, tensive character, or dull and heavy, with tenderness on pressure. Nausea and vomiting, especially with the headache. Spasmodic jerkings, like chorea. Eruption of white pustules on the face and neck, sometimes large, red, papular.—**IGNATIA**: General resemblance to **NUX**. Difficulty of breathing from oppression of the chest; unconscious, sighing respiration; great nervousness and irritability; erratic character of the pains; changeable, sad, moody disposition of the patient; convulsive movements slight, but darting pains

severe. **PHYSOSTIGMA**: Contraction of the pupils; obstinate constipation, with flatulent distension of the abdomen; pain in the stomach immediately after eating. Tetanic spasms with irregular, tumultuous action of the heart. Epileptiform convulsions.—**CANNABIS**: Great pallor of the face; fixed gaze, dilated pupils; irregular, feeble pulse; cold face, with drowsy, stupid expression, sensitiveness to light and sound. Vertigo on rising, with stunning pain in the occiput; pain across shoulders and spine; paralysis of lower extremities and of right arm; convulsions; emprostotonos, with loss of consciousness; collapse; stupor; pale, clammy and insensible skin; feeble, irregular pulse; hysteria and hysterical hallucinations.

Brain-symptoms predominating, **BELLADONNA**, **HYOSCYAMUS**, **BRYONIA**, **OPIUM**, **COCCULUS**, and especially **CUPRUM** and **ZINCUM**, promise to be of service.—**BELLADONNA** is indicated in the early stage by the presence of symptoms denoting violent arterial congestion; later, by deathly pallor, stupor, dull and heavy expression of the face, coldness of the extremities, with heat of the head; fixed and lifeless appearance of the eye; dry, dirty-brown tongue; retention of urine or involuntary micturition.—**HYOSCYAMUS**: Profound apathy; face pale, bloated, cold; small, quick, intermittent pulse; stupor; picking at bed-clothes; deafness; lock-jaw; eyes red, sparkling, protruding; pressive, stupefying headache; sensation as though the brain were loose in the skull; paralysis of the tongue; tongue red, dry, brown, fissured; cadaverous smell from the mouth. Inability to swallow liquids, with spasms following the attempt. Convulsions of single muscles or of sets of muscles, followed by paralysis. Grinding of teeth; starts as if frightened. Shriill screams during sleep. Paralysis of rectum; cutaneous hyperæsthesia.—**BRYONIA**: Vertigo, worse when raising the head; patient is irritable, with sense of confusion in the head. Stitching, throbbing headache, from before backward, into the occiput and neck; sharp, splitting frontal headache. Tenderness and soreness all over, as though bruised, with excessive tenderness over the scalp. Tongue thickly coated white; constant chewing motion of the mouth. Great thirst; vomiting of food, but not of drink; constipation; eruption all over the body, red, like measles.—**OPIUM**: Expression of face stupid; patient lies in bed motionless; face dark red and bloated, head thrown backward,

eyes half closed, dilated or contracted, insensible to light, jaw dropping; respiration deep, slow, snoring. Tongue dry, brown; pulse usually light and quick, sometimes very slow. Flesh feels hot; copious perspiration. If raised from the pillow, the head drops back as though too heavy for the neck and shoulders. Jerking and twitching of the limbs; sometimes convulsions and opisthotonos. Sweats during sleep; sensitiveness to sounds. Symptoms worse from sweating.—**COCCULUS**: Pale, sallow, bloated face, covered with cold sweat. Hardness of hearing, with noise in the ears like rushing water. Violent occipital headache, extending into the neck, with trembling of the head; headache with a sensation as if the eyes were being pulled out of the sockets. Dizziness, with inclination to vomit when rising. Painful stiffness of the neck, with feeling of weakness as though unable to support the head. Weakness and paralytic trembling of the extremities. Spasmodic oppression of the chest, with heavy, labored breathing; sense of spasmodic constriction along the spine, worse from motion. Paralysis of face, tongue, pharynx. Hysterical and epileptiform convulsions; miliary eruptions.—**CUPRUM**: Of particular value in case of children. Stupor. Eyes sunken, surrounded with dark rings. Coldness of the hands; twitching and jerking of the limbs; spasmodic twitching and contortions of the muscles of the face. Child lies on the belly, spasmodically thrusting the breech upward. Violent fits of dyspnoea come on suddenly, continue for a few hours, then disappear as suddenly; threatening paralysis of the lungs. Gurgling noise when swallowing liquids. Clonic spasms beginning in the fingers and toes. Delirium, with great fear of everybody, obscuration of sight and difficulty of hearing. Bruised soreness and pressive pain in the head, made worse from turning the eyes. Paralysis of the muscles of the back and neck.—**ZINCUM**: Case severe, tedious, with great prostration. Frequent attacks of vertigo; impairment of memory; severe pressure on the vertex and forehead, with tearing pain as though the head would burst. Dizzy, stupefying headache, always with vertigo. Intense pain in the head, with dizziness, shivering, followed by excessive vomiting of bile and trembling, relieved from perfect quiet. Anxiety, restlessness. Constant motion of hands and feet; rolling and tumbling of the head from side to side.

Starting from sleep, uttering piercing cries. Spasmodic twitching of hands and feet. Weakness of sight; ravenous hunger; flatulent colic. Scanty, turbid urine, as if mixed with clay. Flashes of heat, alternating with spells of chilliness.

Typhoid symptoms call for ARSENIC, BRYONIA, RHUS, ARNICA, BAPTISIA, and other remedies of the same class; indications for their use may be found under "typhoid fever."

If *blood-dyscrasia* is pronounced, CROTALUS and PHOSPHORUS are also to be considered.—CROTALUS covers the extreme exhaustion, with great pallor, intense restlessness, severe headache, as from a blow on the occiput, intense thirst, vomiting, faintness, ecchymoses, and other characteristic symptoms of a depraved state of the blood.—PHOSPHORUS: Pulmonary complications. Countenance appears cadaverous, bloated; there is marked dyspnoea, worse from the slightest exertion; sensitiveness of the spine. In case of collapse, energetic measures, as hot stimulating drinks, alcoholic stimulants and friction must be promptly used. Of internal remedies CAMPHORA, VERATRUM ALBUM, VERATRUM VIRIDE and CARBO VEGET. are most likely to prove useful.

ERYSIPELAS.

Synonyms: St. Anthony's Fire.—The Rose.

An acute infectious disease, of local origin, characterized by circumscribed or diffuse inflammation of the skin and subcutaneous tissue, chill, fever, and malaise.

Ætiology.—The disease occurs independent of sex, age, occupation, atmospheric or telluric conditions. It is endemic, at times, epidemic. It is contagious, and may be conveyed from person to person or transmitted through the agency of clothing, furniture, bedding, etc. It occurs frequently in badly ventilated and insanitary institutions, such as poor-houses, hospitals, etc., but may prevail in model institutions in excellent sanitary condition. Local causes, as defective pipes, soiled bedding, etc., are intimately connected with erysipelas. It is generally believed that a wound (surgical operation, parturi-

tion) or abrasion of the skin, possibly so slight as to escape detection, or the delicate structure of a new cicatrix, affords access to the specific streptococcus of erysipelas, and that the disease does not arise save in this manner. The remarkable preference shown by erysipelas for the face—the most exposed part of the body—is considered a strong argument in favor of this position. A low state of vitality (general debility, chronic alcoholism or exhausting disease, as albuminuria) and special liability to erysipelatous infection on part of individuals or families are important predisposing causes. It is admitted that one attack creates a predisposition to others.

The streptococcus of erysipelas has not yet been distinguished from the streptococcus pyogenes. Its presence gives rise to the local inflammation of the invaded tissues, and its toxine, absorbed into the system, is largely responsible for the constitutional symptoms which soon follow the invasion. The micro-organism is found in the largest numbers, not at the seat of active inflammation, but in the zone lying immediately beyond.

Morbid Anatomy.—In addition to such changes, *post mortem*, as are peculiar to the visceral complications which may occur, there is evidence only of simple inflammation, with inflammatory œdema and, often, more or less extensive suppuration.

Symptomatology.—The stage of *incubation* varies from three to seven days. It is followed by that of *invasion*, characterized by a severe chill, or several light chills, a feeling of general indisposition, anorexia, gastric discomfort, nausea, sometimes vomiting, headache and fever, with a rapidly rising temperature and, usually, scanty urination. In light cases the constitutional symptoms may be inconsiderable. Violent attacks frequently are ushered in by well-pronounced general symptoms, occasionally delirium from the beginning. If, as is commonly the case, the disease affects the face—and it runs the same course in any other part of the body,—slight redness will show itself over the bridge of the nose and upper cheek, or at the point of abrasion if located elsewhere. Heat, swelling, and redness rapidly increase, the inflammation extending in every direction, the parts presenting a tensely drawn, glazed, swollen, œdematous surface. It rarely involves or passes the chin. Slight vesications and bleb-like formations stud the

skin, which is hot to the touch and itches intensely or burns like fire. The affected parts, especially on the forehead, are bordered by a raised, firm, well-defined line, distinctly felt.

General œdematous swelling now becomes a conspicuous feature of the case, affecting both face and scalp, and greatly disfiguring the patient. The lids are swollen so as to close the eyes; the ears are much enlarged; the neck becomes involved, with much swelling of the cervical glands, though the enlargement of the latter is not easily recognized, owing to the extensive œdema of the neck. After five or six days, during which time the temperature may remain continuously high, but rarely rising above 104° , defervescence by crisis will probably take place, recovery being characterized by perfect restitution of the parts involved.

The constitutional symptoms differ according to the severity of the local inflammation and the age and vigor of the patient. Frequently, and even in cases where the local symptoms are violent, the sustained elevation of temperature is the most marked general effect. In persons whose powers of resistance are low from advanced age, ill health, or evil habits, especially hard drinking, there may be great depression from the beginning. The tongue then is heavily coated, the bowels stubbornly constipated, and the urine scanty and rich in albumin; soon the tongue becomes dry, glazed, brown; delirium, commonly of a muttering character, declares itself; the pulse becomes feeble and rapid, and death from toxæmia supervenes.

Extension of the erysipelatous inflammation may occur, and thus the oral and pharyngeal mucous membrane become involved; more rarely the larynx is affected, and then extensive œdema, intensified by extension from without inward, constitutes a very distressing symptom of the case; or the morbid process may from the face extend to the neck, chest, or other parts; or an actual reinfection may take place, as from a scratch with the finger-nail. In any of these contingencies the temperature at once assumes an upward direction as soon as extension to, or reinfection of, healthy tissue takes place.

The formation of small cutaneous abscesses on the face and neck is not uncommon, and large amounts of pus frequently collect beneath the scalp. When restitution has taken place, no trace of the cutaneous inflammation is left.

Complications.—Among the complications of erysipelas, septicæmia, ulcerative endocarditis and albuminuria are the more frequent, the latter especially in persons of advanced years. A true nephritis is found occasionally, as is pneumonia. Brain-symptoms are often pronounced and of a character which suggests the existence of meningitis; yet, examination after death has failed to prove the existence of meningeal disease, and the conclusion is drawn that the cerebral disturbances are due to toxæmia. A tendency to gangrenous complications is also observed, and is to be dreaded on account of the danger of collapse.

The prognosis is good, except in persons previously debilitated by old age, ill health, or evil habits. It is less favorable in traumatic cases and when erysipelas occurs as a complication of Bright's disease. In the ambulatory form death from exhaustion may result. In the new-born, especially when the navel is attacked, the issue is usually fatal. Gangrenous complications are necessarily serious.

Diagnosis.—The diagnosis rests upon the character of the eruption, the bright redness of the circumscribed area of inflammation, its mode of extension, the formation of blebs and bullæ, the well-defined, hard and elevated margins which surround the area of inflammation, and the rise and decline of the fever in direct proportion to the intensity of the local symptoms.

Treatment.—To prevent the spread of the disease, the patient must be isolated, and neither physician nor nurse be allowed to approach persons specially predisposed to erysipelas by virtue of having open wounds or abrasions, such as lying-in women or surgical cases. Nurses and other attendants must also guard against abrasions and wounds on their own persons. Antiseptic measures, including the proper care of the person of the sick, his clothing, bedding, the various utensils and instruments used, and of the room, are indispensable. All dressings must be destroyed by fire. After recovery or death of the patient the sick room and its contents must be thoroughly fumigated and disinfected by corrosive sublimate wash. These precautions are doubly important in the wards of a hospital or other public institution.

The strength of the patient must be sustained by a generous

allowance of easily digested and nourishing food, preferably liquid. Stimulants may be used when indicated by the general condition of the sick, and are borne kindly.

Local treatment is employed to relieve pain and itching and to limit the spread of the disease; it embraces a great variety of drugs, not any of them of great value. If wet and cold, they are best applied by means of a face mask, made of soft linen cloth, with openings for the eyes, nose and mouth, at brief intervals wrung out of the solution used. Thompson (Pepper's Amer. Text-book) recommends:

R. Liq. plumbi subacetatis f̄jss.
 Tinct. opii f̄jss.
 Aquæ q. s. ad. f̄jviii.—M.

Sig.—For external use.

I have had the most satisfactory results from the use of dry bran or buckwheat, heated in a spider, and applied to the face in bags made of soft linen, frequently changed. Carbolized vaseline is also serviceable.

Attempts to check the spread of the disease by local applications generally prove useless. The only measure which at times seems of service is painting the surface with contractile collodion. Caustics, iodine, the knife, etc., instead of proving useful, are a source of additional danger.

The fever, if high, may be in part controlled by sponging in cold water and alcohol and by the use of wet packs. Antipyretics are discountenanced even by the best authorities of the dominant school. Gangrenous areas must be treated with disinfectants, but the practitioner's chief reliance should be constitutional treatment by the indicated remedy. Abscesses are to be poulticed and evacuated early.

Therapeutics.—**BELLADONNA.** The eruption is of uniform redness, bright, shining, streaked. Congestive type. Characteristic brain symptoms.—**APIS MELLIFICA.** The inflamed surface is rather pale. Œdematous tendency, often involving the larynx; stinging, pricking, burning pain; albuminous urine.—**RHUS TOXICODENDRON.** Inflamed surface bright red, angry; formation of vesicles; much burning and itching; pain in back and limbs, with great general restlessness. After getting wet (?). Characteristic typhoid symptoms.—**CANTHARIDES.** Follows RHUS well. Skin intensely inflamed, with tendency to the formation of large blisters. Burning-pricking. Dysuria.—

LACHESIS. Constitutional symptoms prominent. The eruption is dark, purplish, and the swelling (of the face) great. Worse from dark until midnight. Great depression of the vital forces, with loquacity, typhoid tendency, dry, red tongue which trembles when protruded, etc. Gangrene.—ARSENICUM ALBUM. Great nervous debility, with characteristic restlessness, thirst, and typhoid state. Complete exhaustion of vital energy. Cachexia; secondary, long-continued suppuration, with sanious, ichorous discharges and burning pain. Gangrenous tendency, with burning, like red-hot coals, in the affected parts.

Other remedies occasionally indicated are: ARNICA (swelling hot, hard, tense; tired, lame feeling as if beaten; phlegmonous form); CAMPHORA (great exhaustion, bordering on collapse, even in the early stage); GRAPHITES (tendency to repeated attacks of erysipelas; recurrence of the disease in distant parts; "habitual, often alternating with tettery eruptions"); SULPHUR (psoric taint); CHINA (gangrenous tendency); HEPAR SULPHUR. (suppurative tendency; will hasten or prevent suppuration); SILICA (extensive suppuration, threatening to involve or involving the hard tissues); EUPHORBIA, PULSATILLA, etc.

In the beginning: ACONITE, VERATRUM VIRIDE. Cerebral complications: BELLADONNA, STRAMONIUM, LACHESIS, CUPRUM. Formation of pus: HEPAR SULPH., SILICA, MERCURIUS. Protracted suppuration: ARSENICUM, SILICA, CHINA. Typhoid tendency: ARSENICUM, LACHESIS, RHUS TOXICODENDRON. Gangrenous tendency: ARSENICUM, LACHESIS, SECALE, CHINA.

SEPTICÆMIA AND PYÆMIA.

Septicæmia: A constitutional, generally acute, disease, popularly termed blood-poisoning, due to the absorption of various putrid substances into the blood, which are supposed to act as ferments and so to change it that it cannot fulfill its physiological function. (Foster.)

Pyæmia: A febrile disease supposed to be due to the absorption of pus or its constituents into the blood. It usually follows wounds, suppurative inflammation of bone, or the puer-

peral state, and results in the formation of secondary abscesses in the viscera, joints, and connective tissue. (Foster.)

Septicæmia and pyæmia are closely related ætiologically and clinically. In septicæmia, symptoms of blood-poisoning are the more pronounced; in pyæmia, metastatic processes and abscesses are conspicuous; both present chills, high fever, profuse sweating, hæmorrhages, diarrhœa, great prostration of the nervous system, affections of the joints, and metastatic processes.

Ætiology.—The immediate cause is found in the existence of certain micro-organisms capable of producing pus. They are: (1) The staphylococcus pyogenes aureus, which forms gold-yellow colonies; smaller numbers localized produce in the skin acne, furunculosis, and subcutaneous abscesses; in the interior of the body, suppurations of bones and joints, of the lungs, pleura, liver, heart (endocarditis), and kidneys. It abounds in the air of crowded rooms. (2) The staph. pyog. albus, which forms white colonies. (3) The staphyl. pyog. citreus, which forms lemon-yellow colonies. (4) The micrococcus pyogenes tenuis, which forms perfectly clear colonies. (5) The streptococcus pyogenes, which grows in chains of four, ten, or more, members, spreads rapidly, and gives rise to extensive phlegmonous processes. These various micro-organisms or their products, sometimes both, are introduced through breaks of the surface, wounds (parturient or puerperal uterus, etc.), or upon the heels of other micro-organisms in the course of specific disease (tuberculosis, variola, dysentery, etc.), to cause a mixed infection or constitute the terminal link in the chain of disease process. (Whittaker.)

Septicæmia is seen in at least three forms. The lightest of these is (1) the *fermentation fever*, the brief fever which follows injuries or operations, the latter with especial frequency when the dressings used are such as to cause necrosis of the superficial tissues. Its symptoms are: fever, not preceded by a chill, setting in within a few hours after the injury or operation, rising rapidly until it reaches a temperature of 103° or 104°, subsiding within one to three days, and not accompanied with serious constitutional disturbance.

(2) *Sapræmia*, due to absorption of toxins from some local focus of putrefaction. Symptoms: A chill appears in about

twenty-four, or more, hours after the injury or operation, followed by high fever, rising to a temperature of 103° or 104°, rapid pulse and, in all save light cases, prostration. Gastric irritation, dry, glazed tongue; headache, restlessness and delirium may be present. Senn (*Principles of Surgery*) states that three conditions must be met here: dead tissue, infection of this dead tissue with putrefactive bacteria, and a sufficient time to have enabled the putrefactive bacteria to produce a toxic quantity of ptomaines.

(3) *Progressive Septicæmia*. "The intoxication in this form of sepsis is not only caused by ptomaines which are produced at the primary seat of infection, but ptomaines are also produced in the blood by the microbe which it contains" (Senn). These microbes reach the blood through the wall of the blood-vessels or through the lymph-channels. Symptoms: Within one to four days, rarely later, chilliness or chills set in, followed by moderate fever, which gradually increases and is marked by daily remissions and intermissions; the pulse is light, compressible, 120, or more, per minute. The constitutional symptoms described under *sapræmia* are present but in an intensified form. The tongue is red at the margin, and dry and brown on the surface; nausea, vomiting and diarrhoea are common; prostration is pronounced, with early apathy or delirium; the face soon becomes haggard and drawn or dirty-yellowish in color. Capillary hæmorrhages are frequent.

This form often occurs in the puerperal state and from dissection wounds. It is always serious, and death may take place in one to seven or eight days. After death the parts at the seat of the infection may present no striking changes; the viscera may show no extensive lesion; no thrombi or emboli are found. The blood, however, is usually of very dark color, traces of capillary hæmorrhages are abundant, especially on the serous surfaces, and there is enlargement and softening of the spleen.

Pyæmia.—It is no longer held that this disease is due to the actual presence of pus in the blood, but it is attributed to the presence of micro-organisms, the streptococcus pyogenes and various staphylococci, of which the former are found at the seat of the primary lesion and in the metastatic abscesses. By coagulation necrosis, thrombi and purulent phlebitis are pro-

duced; fragments of these thrombi are carried to distant parts of the body, and, containing the elements of infection, they establish new centres of infection, i. e. embolic or metastatic abscesses, at the point of lodgment. Observation teaches that in case of external wounds, osteo-myelitis, and in acute phlegmon of the skin, the lungs, heart and kidneys usually become centres of suppuration; if the portal system is studded with suppurative foci, metastatic abscesses result in the liver; malignant endocarditis gives rise to multiple abscesses in the spleen, kidneys, intestines, brain, and skin.

Symptoms.—A severe chill, light in exceptional cases, is followed by high fever, the temperature rising to 103° or 104° , and profuse sweating. The chills, followed by fever and sweating, may occur daily or every other day; morning remissions and evening exacerbations are not infrequent. If the case is long-continued, these chills appear at longer intervals and with increasing irregularity, but the tendency to sweating is pronounced throughout the course of the disease. Loss of appetite, gastric irritability, and progressive loss of flesh and strength are concomitants. Enlargement of the spleen, with splenic pain, is common. In cases of unusual severity symptoms of a typhoid character develop, probably with coma and fatal termination.

The local symptoms, which greatly modify this picture, vary according to the organ or organs involved.

The *chronic form* is characterized by chronicity of the course, the irregularity and comparative mildness of the chills and subsequent fever, and preference for the joints and superficial structures. If the patient does not die from exhaustion, he is usually left more or less crippled from stiffening or other injuries of the affected joints.

The prognosis is always grave.

Diagnosis.—No difficulty is experienced when the disease follows injuries, operations, or parturition. *Typhoid fever* differs from pyæmia in its more deliberate onset and in its type. *Tuberculous* troubles, in the absence of well-defined physical signs, may readily be confounded with septicæmia, and a clear differential diagnosis under such circumstances may be impossible. *Rheumatism* has not the successive chills nor the metastatic abscesses of pyæmia. *Malaria* has more pronounced

periodicity, responds to quinine, and may be recognized by bacteriological examination.

Exceptionally, Hodgkin's disease, the hepatic fever due to the lodgment of gall-stones, and even the fever accompanying rapidly developing cases of cancer, defy attempts at differentiation from pyæmia. It may also prove a difficult task to recognize pyæmia when arising from such obscure sources as otitis or gonorrhœa.

Some writers describe a septicopyæmia, a condition in which the symptoms of both septicæmia and pyæmia are present.

Treatment.—Prophylaxis consists of asepsis and antisepsis. Direct surgical treatment is effective when the seat of primary infection is within reach or when the metastatic abscesses are accessible; in such cases antiseptic washes, the use of a dilution of *Calendula* in water, opening and thorough cleansing of the abscesses formed, are obviously in place. In addition, the strength of the patient must be sustained by proper, nourishing diet and stimulants.

Therapeutics.—In selecting the remedy, cognizance must be taken of the primary cause, the constitutional affection, and the local manifestation of the disease.

To be truly curative, the remedy must be capable of reaching that general systemic depravity which belongs to the condition. Hence the great value here of *ARSENICUM ALBUM*, *CHININ. ARSEN.*, *BAPTISIA*, *PHOSPHORUS* and *CHINA*, remedies of far-reaching power whose symptomatic indications need not be here enumerated.

LACHESIS has to a remarkable extent the power to produce extreme prostration of the nervous system, to disorganize the blood, and to affect suppurative processes. Hence, its applicability to cases of pyæmia with typhoid tendency. It is very useful when the liver is invaded and hepatic abscesses threaten or exist. In puerperal pyæmia, and in all cases involving the intestinal tract or the pelvis, it is one of the most prominent remedies. *RHUS TOXICODENDRON*, the *MINERAL ACIDS* and *ARNICA* are also to be consulted. *PHOSPHORUS* is valuable when *lung* or liver complications are present.

HEPAR SULPHUR. and *SILICA* are useful by virtue of their close relation to the suppurative process. *SILICA* covers to a nicety the symptoms most frequently found in pyæmia as a distinct-

ive state, including the nervous tension, the hectic fever and profuse sweating, offensive discharges, glandular swellings, with tendency to suppurate, sensitiveness to cold, etc.

The simple "fermentation fever" which follows injuries or operations rarely requires medication; when remedies are demanded, the indications will almost surely be met by ACONITE, ARNICA, GELSEMIUM and VERATRUM VIRIDE.

ANTHRAX.

Synonyms: Malignant pustule.—Contagious carbuncle; Charbon.—Mycosis intestinalis.

An acute infectious disease, occurring primarily in animals, especially in sheep and cattle, due to infection with the bacillus anthracis (Pollender, 1849). The bacilli anthracis are thread-like bodies from two to ten times as long as the diameter of a red blood-corpuscle; they multiply by fission, and set free spores which possess remarkable tenacity of life, resisting gastric digestion and, for several minutes, a temperature of 212° F. They occur in the blood, milk and tissues of animals who have died from anthrax, in the pastures occupied by diseased animals, and probably in the earth. The disease is "the most wide-spread of all infectious disorders;" but is comparatively infrequent in America.

In man, anthrax is the result of direct inoculation, through the skin or intestine, with the infectious agent. Thus, herders, butchers, and others brought into contact with animals suffering or dead from anthrax, are easily inoculated at the seat of even a slight abrasion or wound. Persons who in the pursuit of their business handle the carcasses, hides or hair of infected animals, as do the buyers of hides and hair, hair-pickers and sorters, rope-makers, or laborers in factories where these articles are used, are often affected. It is probable that flies and other insects frequently carry the infection. Intestinal infection usually results from eating the meat or drinking the milk of infected animals.

Anthrax occurs in two forms, the external (malignant pustule) and the internal (intestinal mycosis).

Malignant pustule is seen in some exposed part of the body, as the arms, hands, or throat. A few days, from three to seven, after the infection, a vesicle appears at the seat of the infection, which rapidly increases in size, becomes excoriated, and soon assumes a dark-bluish, black color. Diffuse hard swelling and redness of the surrounding parts takes place promptly; secondary vesicles are formed, with rapidly increasing and extensive swelling of the parts, the swelling and soreness soon involving the neighboring lymph-glands. Bright-red lines radiate from the pustule. High fever and great prostration accompany this condition. Recovery takes place with decline of the fever, sloughing of the parts, and healing of the sore. In case of a fatal termination the constitutional symptoms increase in intensity, soon overshadowing the local affection, and the patient dies from intestinal complications or with symptoms of profound prostration of the nervous system, as delirium, stupor, coma. In other cases an intense œdema, chiefly seen about the head, hands and arms, appears in place of the pustule, rapidly developing extensive gangrene, with profound constitutional involvement and fatal termination within a few days (*malignant anthrax œdema*).

Intestinal anthrax or *intestinal mycosis* is characterized by symptoms of severe intestinal disorder, as vomiting, diarrhœa (at first usually painless), moderate fever, and pain in the legs and back. The patient soon complains of dyspnoea and a sense of great oppression in the chest, followed by restlessness, coldness of the nose and extremities, rapid and small pulse, livid appearance of the surfaces, often hæmorrhage from the mucous membrane, and spasms and convulsions. The fever is rarely high, and a subnormal temperature may supervene. Utter prostration of the nervous system results, and death follows in a few days. In some cases small phlegmonous sores or carbuncles have been observed during the course of the disease. The existence, occasionally, of a pustule on the hand or some other exposed part of the body, for a considerable period prior to the appearance of the constitutional disease, argues in favor of general infection from a local disease.

The so-called *Wool-sorter's Disease* is a mild form of intestinal mycosis with pulmonary complications, as: rapid breathing, pain in the chest, cough, and signs of bronchitis.

In exceptional cases both forms are seen simultaneously in the same patient, malignant pustule being accompanied with intestinal mycosis.

Fatal cases exhibit after death catarrhal inflammation of the intestinal mucous membrane, with dark, infiltrated hæmorrhagic spots, a trifle larger than a dime, situated in the small intestine and in the upper colon. The spleen usually is dark, congested and moderately large. The lymph glands are swollen and ecchymotic spots may be found in the kidneys, brain and serous membranes. Anthrax bacilli abound in the affected organs and in the lumen of the blood vessels.

The diagnosis is easy when the cause of the disease is apparent; otherwise it may be difficult, especially in the early stage of the intestinal form. A demonstration of the existence of the anthrax bacilli may be necessary to determine the nature of the affection.

Treatment.—Cauterization, incision, and excision of the pustule is objectionable. "It should be borne in mind that such manipulations may easily contribute to a local extension of the anthrax poison" (Struempell). Osler recommends destruction of the site of inoculation by the caustic or hot iron, with sprinkling of powdered bichloride of mercury over the exposed surface, and the subcutaneous injection of solutions of carbolic acid or bichloride of mercury, two or three times daily, at various points around the pustule to prevent the local development of the bacilli about the site of inoculation. Struempell merely places the limb in a suitable position and applies an ice-bag over the diseased spot. The use of disinfectants and charcoal poultices is proper.

In the early stage of the local disease **BELLADONNA** may be indicated by the bright redness of the parts, the throbbing pain, and the erysipelatous tendency.—**LACHESIS** has the bluish color of the anthrax pustule, with intense burning pain in the parts, relieved by the use of cold water. There is profound depression of the nervous system. It covers the tendency to hæmorrhagic effusions and to the typhoid state.—**ARSENICUM**. The pain is burning, as from a live coal on the part; rapidly developing and intense prostration, with small, irregular, rapid pulse; diarrhœa; collapse; hæmorrhagic tendency; typhoid state.—**APIUM VIRUS**. Predominance of erysipelatous and œde-

matous symptoms.—RHUS TOXICODENDRON. Characteristic restlessness, erysipelatous tendency, typhoid state.—ANTHRACINUM is recommended by Raue when the burning pain is violent and not relieved by ARSENICUM; cerebral symptoms, gangrenous destruction of the affected tissues, blood-poisoning.

If the immediate danger has passed and sloughing takes place, with promise of recovery, HEPAR SULPHUR., SILICA, CHINA and other remedies of this class are indicated.

ASIATIC CHOLERA.

An acute, infectious disease, usually occurring as an epidemic, due to the presence of the comma bacillus of Koch, and characterized by violent purging and tendency to collapse.

“The disease is due to a specific virus, namely, a germ which enters the body through the alimentary canal and attacks the small intestines, where it develops ptomaines, which, on being absorbed into the system, produce constitutional symptoms. The disease is propagated by fomites and by direct contact with the stools. The chief agent for its dissemination is contaminated drinking water. The contagion multiplies with extreme rapidity both inside and outside the body, and it thrives especially in warm, moist putrefactive organic matter.” (W. Gilman Thompson.)

The existence of the *comma bacillus* in cases of Asiatic cholera was demonstrated by Koch in 1884. It occurs in no other disease. Inoculation of guinea pigs and dogs has produced in them a true type of Asiatic cholera. Koch's bacillus is shaped like a comma or curved rod, sometimes like the letter S, is about one-half the size of the tubercle bacillus, but thicker, and is endowed with motion. It perishes after thorough freezing, is sensitive to acids, especially lemonade (Uffelmann), and is quickly killed by carbolic acid, corrosive sublimate, etc. It thrives abundantly in foul, contaminated water, and has been found in large numbers in wells and streams contaminated by the washing of linen used by persons sick of cholera. It occurs early and in great numbers in the intestine of choleraic patients, in the stools, especially in the rice-water discharges,

rarely in the vomit. Examinations, *post-mortem*, show that in rapidly fatal cases it has not invaded the intestinal walls; in more protracted cases the follicles and deeper tissues contain large numbers of the bacilli.

It is generally conceded that contaminated water is in the great majority of cases the medium through which the bacillus gains entrance to the human body. The history of recent epidemics in India, England, and Germany has amply demonstrated this fact, and has also proved that a generous supply of pure water will in a short time stamp out the disease. The importance of maintaining the purity of water is evident from the constant and varied use made of it, not only for drinking purposes, but in the preparation of food in the kitchen (as the washing of vegetables preparatory to cooking). Milk is frequently diluted with water, and may thus become polluted and a disease carrier. The same applies to the washing of dishes, linen, etc.

In some cases the germ undoubtedly is inhaled, but it is conceded that, to do mischief, it must reach the intestine, in whose alkaline contents it flourishes.

Pettenkofer applies his subcil theory to the propagation of cholera, as he does to typhoid fever, and maintains that a moist, porous soil, contaminated with organic matter, such as sewage, especially in dry weather following a very wet period, in other words: conditions which are favorable to putrefactive fermentation, eventually contaminating wells and streams or rising into the atmosphere as miasma, are quite sufficient to account for outbreaks of the cholera. A study of the epidemic in Calcutta, India, Buda Pesth (1886 and 1873), and in Munich (1873) seems to establish the soundness of this view.

Among *predisposing* causes those constitutional states are to be mentioned which lower vitality and thus lessen the power of resistance to any infection or miasm; ill health, intemperance of any kind and the weakness of old age belong to these. Insanitary conditions, foul air, filth, improper food, insufficient and dirty clothing, are also powerful predisposing factors; persons living under such surroundings furnish so large a proportion of the victims that cholera might well be called a filth disease. Excessive fear, by its depressing influence, may

become an important predisposing cause. Age affords no protection, but the young are least liable. The *season* of the year in which cholera prevails most extensively in Europe and in America is late summer and fall; the comma bacillus thrives during hot weather and does not bear cold; hence the relief which invariably comes with the approach of winter. As to *locality*, preference is shown for a low altitude and for places situated on the level of the sea. The disease rarely occurs on elevated plateaus.

The contagion does not spread by the air, but by direct contact. It follows the line of human travel, preferably waterways. It may be conveyed from person to person, chiefly by fomites; also to distant places, as in mail-matter. Contact with the stool of persons sick with cholera constitutes its chief mode of propagation.

Morbid Anatomy.—The changes, *post mortem*, are not characteristic. Milles, half an hour after the death of a person from cholera, found that the small intestine was of a rose-red color and distended as if paralyzed. It contained a typically clear stool. The mucous membrane was swollen and denuded of its epithelium. The follicles were filled with epithelial detritus and comma bacilli, and their orifices appeared as red spots. Comma bacilli were also discovered in the subepithelial tissue. Rigor mortis is marked, sets in early, and continues long. Muscular fibrillations are often sufficiently pronounced to cause movements of the jaws, eyelids, fingers, or extremities; the internal organs are drained of blood and liquids; the blood, especially in the right ventricle, is dark, and may be of the consistency of tar. The spleen is small, the heart flabby, the lungs collapsed. There is frequently a *post mortem* elevation of the temperature.

Symptomatology.—Clinically the disease is divided into 1) the stage of incubation; 2) the preliminary diarrhoea; 3) the algid stage; 4) the stage of reaction. Of these, the stage of incubation is not well defined and may continue for several (two to five) days.

The *preliminary diarrhoea* is characterized by more or less persistent colicky pains, with diarrhoea, vomiting, headache, mental depression, and some degree of apprehensiveness, possibly fever. Occasionally these symptoms set in suddenly; again

they develop gradually, a faint uneasy feeling in the bowels commonly first arresting the attention of the patient. The tongue, at first, is pale and moist; later it becomes dry. It is worthy of note that the alvine discharges even in this stage contain large numbers of the specific bacilli, and must therefore be handled with extreme care.

The *algid stage* (stage of asphyxia, stage of collapse). The characteristic symptoms are those of rapidly increasing diarrhœa, with profuse vomiting, intense thirst, excessive restlessness, cramps in the legs and feet, and collapse.

The *diarrhœa*, from the beginning of this stage, rapidly increases, and is accompanied with griping, sometimes tenesmus, but oftener with a sensation of great faintness in the abdomen. The *stools* are alkaline, odorless, possibly of a faint "meaty" odor; very thin, at first yellow, then of a turbid grayish-white, like *rice-water*, frequently containing flakes of mucus and granular matter, sometimes traces of blood. Later in the stage of collapse the evacuations may assume a dark appearance and become very offensive. The stools are expelled with a gush and in such quantities as to drain the blood.

In some cases a temporary sense of relief is experienced after the stool.

Vomiting becomes severe a few hours after violent diarrhœa has set in; it may follow at once. It is copious, usually without effort, gushing from the mouth with sufficient force to spurt several feet from the body, and often incessant. *Thirst* becomes inappeasable as the system is drained of its liquids; the tongue is white, but dry; uncontrollable restlessness and intense anxiety supervene.

Cramps in the legs (calves) and feet are severe and may cause much suffering; they do not appear suddenly, at a stroke, as in tetanus, but come on gradually and grow worse continuously.

Symptoms of *collapse* now appear, shown in the ashy-gray face, sunken eyes, ghastly features, pinched nose, coldness of breath, huskiness of voice, and cold, wrinkled, clammy, bluish condition of the skin and extremities. The pulse becomes more and more rapid and feeble. The secretion of urine is suppressed. The temperature sinks, and the mouth and axilla may register several degrees below the normal, while in the rectum there is shown a temperature of 103° or 104°.

The excessive loss of the fluids of the body results in thickening of the blood and in the arrest of the secretions, notably of saliva and urine; sweating continues. Death occurs from asthenia or asphyxia, in rare instances preceded by coma.

This stage may not be preceded by the more common preliminary diarrhœa, but set in suddenly and with intense violence; in cases tending to a rapidly fatal termination death may take place in two or three hours; more frequently the algid stage lasts from twelve to twenty-four or thirty-six hours. Again, death may occur before purging sets in (*cholera sicca*).

Stage of Reaction.—The patient having passed safely through the dangers of this condition, recovery is ushered in by a general amelioration of symptoms. The intestinal uneasiness and colic improves; vomiting, cramping and ravenous thirst gradually cease; the stools occur at longer and increasing intervals, assume firmer consistency and natural color and odor; with it, there is return of bodily warmth, increasing steadiness and vigor of the heart's action, and reappearance of the urinary secretion.

Complications, however, may arise. Diarrhœa may return and result fatally. At times the epithelial surface of the intestine has been denuded to an extent which greatly retards or endangers recovery. In the former case more or less protracted hæmorrhagic tendency is observed; in the latter, a typhoid state (*cholera typhoid*) may develop, due to sepsis from absorption, with dry tongue, delirium, coma, and death; or, if not fatal in termination, there may develop a low, protracted fever of the typhoid type, with tedious recovery. Both forms are accompanied with eruptions, as erythema, roseola, urticaria, first on the forearm and wrist, later on the face and body, but rarely extensive. In other cases symptoms of uræmic poisoning may show themselves, with profound nervous prostration, delirium, convulsions and death.

Forms of Cholera.—An epidemic necessarily presents a great variety of forms. The term *Cholérine* is used to designate the mild form, resembling the *cholera nostras* which prevails during the hot season of temperate climates; it consists of an active diarrhœa with more or less vomiting, and is dangerous to the public health chiefly because of indifference of the public to the fact that the stools of such patients contain all the ele-

ments of danger to others which belong to the most serious form of the disease. *Cholera sicca* has been described; it furnishes a large number of fatal cases. In still more serious cases the poison completely overwhelms the system and the patient dies comatose within a few hours.

Complications and Sequelæ are chiefly such secondary affections as result indirectly from the exhausted, low state in which the convalescent is left. To the typhoid complications already mentioned, there may be added pneumonia and renal affections, especially consecutive nephritis. Various eruptions, furunculosis, abscesses, bed-sores, diphtheritic inflammations of the mucous membrane, particularly of the throat and genitals, parotitis, weakness of the digestive organs and of the circulation, persistent cramps in the legs and arms and general irritability and weakness of the nervous system are among the more common sequels.

Duration.—The duration of an attack of cholera varies from a few hours to several days, according to the form of the disease; if fatal, the average case usually terminates in two or three days. The stage of reaction may be prolonged indefinitely. The duration of an epidemic rarely exceeds one month in a stated locality.

Diagnosis.—Asiatic cholera so closely resembles clinically the cholera nostras of the temperate climate that a positive differential diagnosis can only be made by bacteriological examination. Cases of poisoning with arsenic, corrosive sublimate, certain fungi, and ergot closely resemble cholera.

Prognosis.—The mortality ranges from 30 to 80 per cent.; during the epidemic at Hamburg (1892) it was 43 per cent. Low temperature, marked cyanosis, and rapidly developing collapse are very unfavorable symptoms. During an epidemic the mortality is greatest in the early and middle period.

Treatment.—As stated by Rohé (Text-book of Hygiene, 1895), prophylaxis comprises such measures as will prevent the admission of the cholera poison into a community, arrest the development of the poison after its introduction, and reduce the individual susceptibility to attack.

To accomplish the first, as applied to America, quarantine at sea is undoubtedly most effective. Detention of suspected passengers, and disinfection of soiled linen under dry heat

(250° F.), covers the necessities of the case as demonstrated in the harbor of New York in 1893.

To arrest the development of the poison after its introduction, local sanitation must be vigorously enforced. Absolute cleanliness of yards, dwelling houses, soil and water must be secured. The bearing of polluted soil upon the disease has been discussed, and the necessity of maintaining a supply of pure water for all domestic purposes has been shown. It is always well to boil water and then cool it. Filtering alone is not sufficient. It is obvious, also, that self-preservation on part of a community demands not only the energetic enforcement of these precautions, but prompt, intelligent and free medical service to the poor, and, if necessary, the establishment of free hospitals, both for the purpose of aiding the sick poor and of insuring the practice of such precautions as will lessen the danger of spreading the infection broadcast. Isolation of all the sick and thorough disinfection in every direction are, of course, important.

To reduce *individual susceptibility* to the disease, special pains must be taken to use only pure water for all domestic purposes, especially for drinking; errors of diet must be avoided, and any derangement of stomach or bowels must receive attention. Undue fear is a depressant, and thus becomes a predisposing cause of the disease. Mental worry, overwork, exposure, etc., are to be shunned.

Strong lemonade or a solution of 15 drops of dilute sulphuric acid in a glass of water, sweetened, is highly recommended; it has been demonstrated that the comma bacillus cannot live in acid solutions. Copper and arsenic (*vide infra*) are also valuable prophylactics.

A person once sick with cholera, isolation, perfect rest, and disinfection of stools and vomited matter are imperatively demanded. The latter may be accomplished by mercuric chloride, carbolic acid, and chloride of lime. The first is the most efficient; and a solution of 1:1000, added to an equal proportion of the discharges, will render them harmless after an exposure of not less than two hours. To prevent accidents resulting from having so dangerous a solution about the premises, it should be colored with permanganate of potash or sulphate of copper. In water-closets provided with lead pipes the mercuric

chloride solution cannot be used; chloride of lime (1:100) or carbolic acid (1:20), *if reliable*, may be employed; Rohé recommends Little's soluble phenyle (1:50), which readily mixes with water; it is both a disinfectant and effective deodorizer.

After recovery or death, clothing, bedding, utensils which were used in the sick room, and the room itself, including the walls, must be thoroughly fumigated, treated with mercuric chloride wherever possible, and freely exposed to the air.

The patient requires close attention. His thirst may be gratified with bits of broken ice, champagne, carbonized water, lemonade, hot coffee. The application of external heat will prove grateful; it may be applied to the abdomen by means of cloths wrung out of hot water, blankets, etc.; jugs of hot water along the spine and sides of the body and at the feet, or hot sand-bags, add greatly to the comfort of the sick one.

The cramps may be somewhat relieved by heat and by brisk rubbing of the parts with the bare hand. Irrigation of the whole bowel with a hot one per cent. solution of tannic acid or with a mercuric bichloride solution (1:100000) has its warm advocates. Cantani has had good results from the use of the hypodermic clyster, by means of which he injects at either loin, behind the ribs, a solution of common salt, one drachm to a quart of distilled water, to which has been added fourteen grains of carbonate of soda. The skin is punctured with a fine trochar, the trochar withdrawn, the tube of a fountain syringe introduced, and the fluid allowed to flow; gentle massage stimulates its absorption. This treatment, variously modified by different practitioners, has met with much favor, and excellent results are claimed for it; it supplies to the blood liquids withdrawn by the copious stools, and it antidotes, to a certain extent, the poisonous action of the toxins. Collapse is met by the use of stimulants by the mouth or hypodermically. Camphor is very useful. The kidneys may be stimulated, especially during convalescence, by hot baths and copious drafts of hot water. The diet during convalescence should be fluid and nutritious, as soup, milk, broths, gruels, egg in milk.

Therapeutics.—The remedies which have proved most reliable in past epidemics are CAMPHORA, CUPRUM, ARSENICUM and VERATRUM ALBUM.

CAMPHOR has made a peculiarly brilliant record, both as a prophylactic and as a remedy.

Its value as a prophylactic has been tested in every epidemic of cholera since Hahnemann first suggested it; experience has shown that drop-doses, three or four times daily, of a saturated solution of the gum camphor in alcohol (Rubini's Camphor), is most effective. No candid observer can call into question the reliability of the testimony offered on this point. In the first stage Hahnemann advised the instant use of camphor on the appearance of cholera symptoms, one drop on a lump of sugar, every five minutes; in severe cases he also recommends rubbing the palms of the hands and other parts of the body with a solution of camphor. If the patient is unconscious or unable to swallow, he gives an enema of two teaspoonfuls of camphor in half a pint of warm water; he also advises the evaporation of camphor on a hot iron in the room. In the stage of collapse camphor again is invaluable, and should be given in five-drop doses on sugar; in very grave cases, ten drops may be given every fifteen minutes. Cigliano, of Naples, and many others, like the late Dr. J. P. Dake (see Arndt's System), who have had extensive clinical experience with Asiatic cholera, claim for camphor remarkable results, even a mortality not to exceed one per cent.—CUPRUM is credited with prophylactic powers not only by homœopaths, but, after the epidemic in France (1884), by Claude Bernard, Charcot, and others as eminent. It was observed that workmen in copper foundries or in shops filled with copper dust were almost exempt from the cholera when the disease was raging all around them. For purposes of prophylaxis the salts of copper have been used in doses of from fifteen to twenty centigrams a day; the lower triturations of the metal are effective, insoles of a thin sheet of metallic copper, worn between the boot and stocking, have been found to answer the same purpose. Hahnemann considered CUPRUM indicated in the *second* stage of the disease, to be given at intervals of half hour or hour. Indications: Very painful clonic spasms in different parts of the body; great pressure in the pit of the stomach, worse from contact; constriction of the chest; great thirst; gurgling noise when drinking; anxiety; cold face, blue lips; coldness all over; urine suppressed. Colic is usually severe; there are no aggravations from drinking; in fact, cold water relieves for a time both vomiting and diarrhœa.—ARSENICUM.

ARSENICUM has made an excellent record. The pathogenesis of the remedy presents a striking similarity to the clinical picture of cholera, and its exhibition, when indicated, has been so satisfactory (as, for instance, in the recent epidemic at Hamburg), that many practitioners look upon it as a very sheet-anchor in the treatment of cholera. The symptoms commonly present are: Great restlessness and anguish, increasing toward night; fear of death; pale, distorted face, with dark blue rings around the eyes; great thirst, with intolerance of cold water, even in small amounts. Violent burning pain in the stomach, worse from vomiting, which is frequent. Great oppression and constriction of the chest; voice hoarse, husky; coldness and bluish appearance of the extremities; skin wrinkled, dry, cold, clammy, sticky; *objective coldness, subjective heat*; cramps in the calves of the legs. Hippocratic countenance. During the Hamburg epidemic the higher attenuations failed to relieve; the 3d and 4th dec. cured promptly. The arsenite of copper has been successfully used.—VERATRUM ALBUM. VERATRUM has violent vomiting and purging, with constant desire for cold drinks; copious, watery stools, without odor, mixed with white flakes; icy coldness of the body, of the tongue, of the breath; loss of voice; anguish in the chest; violent colic, with great sensitiveness of the abdomen to touch; severe cramps in the calves of the leg. Cold sweating. Expression of deathly anguish in the features.

In the preliminary diarrhœa and in diarrhœa occurring during a cholera epidemic the following are to be consulted: IPECACUANHA: Vomiting most prominent, chiefly of sour fluid. COLOCYNTHIS: Great colic; frequent watery diarrhœa; cramps in the calves; vomiting of ingesta, later of green substance. CROTON TIGLIUM: Violent vomiting, gushing out of yellow, watery discharges mixed with whitish flakes; rumbling, griping in the bowels, later burning in the anus; evacuations brought on by motion and effort of any kind; great exhaustion. JATROPHA CURCAS: Easy vomiting of large quantities of water or of a substance resembling the white of egg; gurgling noise in the abdomen, sounding as though a bottle were emptied; watery stools, gushing forth like a torrent; abdomen drawn in; coldness of the body; cold, sticky perspiration; pulselessness.

PODOPHYLLUM, RICINUS, IRIS, and others, may have to be con-

sulted. RHUS TOXICODENDRON and BRYONIA are frequently suggested by the presence of typhoid symptoms (cholera typhoid). HYDROCYANIC ACID is to be considered when there is a condition of extreme prostration and a tendency toward asphyxia. SECALE CORNUTUM has proved useful in exceptional cases. The vomiting has ceased, but diarrhœa continues; aversion to heat or to being covered, though the surface is icy cold; numbness and pricking in the fingers and toes; the fingers spread wide apart.

DYSENTERY.

This term covers a group of symptoms widely differing in their ætiology and pathology, and constituting a state characterized chiefly by intestinal flux with discharges of mucus, blood, pus, and tissue-débris, accompanied by severe colicky pain and tenesmus.

Ætiology.—Dysentery is essentially a disease of the tropics, where it is both endemic and epidemic. It is, however, common in the temperate zones and occurs sporadically in the United States, where it often assumes epidemic form, at times with a high rate of mortality. In the Southern states, especially in southern cities, cases of dysentery exist constantly, and epidemics are frequent and severe.

The disease is more liable to occur during the hot season of the year, in late summer and autumn. It spares no age, sex, or race, but shows some preference for adult males, who, as a class, are more subject to predisposing influences. Among the latter may be mentioned sudden changes of temperature; malarial conditions; the use of impure, especially stagnant, drinking water or of water contaminated with the stools of dysenteric patients; indigestion, particularly indigestion arising from the use of bad food or unripe fruit; severe constipation; unhygienic surroundings; great mental depression. It is possible that to this latter cause is due, nearly as much as to bad surroundings and improper food, the prevalence of dysentery among prisoners of war and soldiers.

The specific cause of dysentery has not yet been determined, but its ready appearance, in epidemic form, among armies ar-

gues strongly in favor of the existence of an infectious agent. The amoeba coli, "a unicellular, motile body, measuring twenty to fifty micromillimeters in diameter, and consisting of granular protoplasm which contains a nucleus and several vacuoles" (Pepper), first described by Lamb (1859), and since then studied by other observers, is constantly present in the epidemic form of the tropics. Various other organisms have, however, also been found. The preponderance of evidence tends to prove that dysentery is not contagious.

Clinical History.—Since the term "dysentery" covers a group of symptoms which differ essentially in cause and expression, a division into distinct forms is natural and practical. The clinical forms recognized are: the sporadic, epidemic, and chronic. The pathological forms are: the catarrhal, the amoebic, the diphtheritic or pseudo-membranous, the chronic.

The catarrhal form.—The large intestine, almost exclusively, is the seat of the affection, the lower ileum being occasionally involved. There are found areas of injected, swollen mucous membrane, covered with tenacious, blood-tinged mucus, sometimes containing pus. Extravasations of blood, punctate or diffuse, are frequently present. There is enlargement of the solitary follicles, from the size of a pin-head to that of a pea, standing out prominently (acute follicular colitis, follicular dysentery). If severe, there is follicular ulceration and necrosis of tissue at the apices; this process may extend, involving the surrounding tissues, penetrating deeply, and presenting numerous ulcers with undermined walls and small openings, surrounded by cellular infiltration and honey-combing of the entire mucous layer; in these cases necrosis and sloughing of intervening tissues may become extensive.

Symptoms.—Usually some slight loss of appetite and uneasiness in the bowels, rarely chill or chilliness, possibly moderate fever, are the only premonitory symptoms. There is slight diarrhoea, at first painless, gradually increasing, which after thirty-six to forty-eight hours is characterized by severe griping, straining and tenesmus. The evacuations from the bowels increase in frequency and soon present the characteristic features of dysentery.

The constitutional symptoms are comparatively mild in the majority of cases; there is little fever, the temperature rang-

ing from 102° to 103° ; there may be nausea and vomiting, but often there is no gastric disturbance, and food is taken with relish and retained. Thirst is nearly always present, and often is excessive. The tongue, at first furred and moist, later becomes red and glazed. The stools at first contain mucus and blood, mixed with small, hard lumps of fæcal matter (scybala); they rapidly increase in frequency and assume a glairy, gelatinous appearance, still containing blood. There is almost constant urging, with intense, exceedingly painful straining and tenesmus, usually relieved, for a short time only, after a stool; the number of stools had during the twenty-four hours is estimated at from fifteen to two hundred, and the amount passed is entirely out of proportion to the pain connected with the act.

At the end of the week, or in exceptional cases earlier, the stools become less frequent and opaque in appearance; shreds of mucus and tissue-débris, grayish brown, are passed; soon they assume a greenish color and become mushy in consistency; then the admixture of blood and mucus grows less, the amount of fæcal matter increases, and recovery takes place.

Such an attack lasts from eight to ten days, sometimes much longer, even to four, or more, weeks. The prognosis is favorable, save in quite young children. Complications are rare. Recovery usually is perfect, but the disease may assume a chronic form, especially when the attack has been prolonged.

Amœboid (or Tropical) Dysentery.—The dysentery of the tropics, particularly fatal when occurring in epidemic form, and characterized by the presence of the amœba coli (amœba dysenteriaë).

The parts involved are the large intestine, preferably the cæcum, hepatic and sigmoid flexures, and the rectum, sometimes the lower ileum. There is infiltration of the submucous tissue which results in a round, well-defined elevation of the parts above the general level of the intestinal mucous membrane, followed by sloughing of the latter. The ulcer formed is round, oval, or irregular, with ragged, undermined, infiltrated edges; the floor is grayish-yellow, and may be formed of the submucous, muscular, or serous coat, according to the depth of the parts involved; the aperture is much smaller than the base of the ulcer. These ulcers frequently are connected by

sinuous openings, covered with healthy mucous membrane. If the disease is extensive, the entire gut is thickened, and may be fairly riddled with ulcerations. A notable feature is the small amount of pus present. Sloughing occurs and in severe cases may be very extensive, especially so when there is pseudo-membranous formation, as is not infrequent. Extension of the ulcerative process depends upon progressive infiltration of the connective tissue-layers and necrosis of overlying structures. Healing takes place by fibrous tissue formation at the bottom and edges of the ulcer, and, in rare cases, this may give rise to partial and irregular stricture of the bowel.

Secondarily, abscesses in the liver may form, characterized by the presence of amœbæ and by the same relative absence of pus noted in the intestinal lesion. These abscesses are more frequently seen on the convex surface near the attachment of the liver and diaphragm or on the concave surface over the bowel. Sometimes extension, by continuity, into the right lung has been observed. If multiple, the abscesses are small. Their walls usually are soft and necrotic; if old, hard and fibrinous.

Symptoms.—The onset may be sudden, particularly in very severe cases; more frequently the attack develops gradually. Many of the symptoms described under catarrhal dysentery may be absent, as: fever, pain, tormina and tenesmus, even mucus and blood in any considerable quantities; again, all these may be present. A moderate degree of abdominal pain and tenesmus is quite common in the early stage, but will probably disappear later on. The characteristic of this form of dysentery lies in the fluidity of the stools, of which from six to twelve are passed daily for a period of from six to twelve weeks; these stools are yellowish-gray in color and commonly contain a slight admixture of mucus and blood.

The disease runs an irregular course and presents frequent exacerbations and remissions.

The prognosis is serious. As stated, the duration of the disease, even without complications, covers a period of from two to three months and involves such dangers as arise from great muscular exhaustion, anæmia, relapses, secondary hepatic abscesses, and a decided tendency to chronicity. The rate of mortality is high, death being due to the extensive character

of the local lesion, profound exhaustion of the system, or to complications.

The *Pseudo-membranous* (or diphtheritic) form.—This type affects the colon, but exceptionally extends into the lower ileum. If the case is mild, the tops of the folds of the colon are covered by thin, yellowish-gray membrane; if severe, the walls of the gut are thickened and stiffened by the infiltration, the mucous membrane itself appearing as a tough yellowish-gray substance, composed of fibrin, pus and blood, and wanting in glandular elements. Sloughing occurs, involving the submucous and muscular layers. (The Army Medical Museum at Washington, D. C., has among other specimens a tubular cast fourteen inches long.) The separation of the slough exposes irregularly shaped ulcers as above described, which may eventually perforate.

This form may appear as a primary or as a secondary affection. If the latter, it follows exhausting diseases (Bright's disease, cardiac affections) or certain acute diseases, more often pneumonia.

Symptoms.—If primary, the onset is usually sudden and severe, with high fever, prostration, great pain, abdominal distension and tenderness, frequent stools, and even delirium, clinically resembling typhoid fever. The stools may contain mucus and blood, and at first commonly do, but the symptoms lack the clear-cut character of the follicular form, and tenesmus is often absent. In the *secondary* form the bowel symptoms are so negative that the intestinal lesion may easily be overlooked, a few copious, liquid, exhausting stools daily, not always containing mucus or blood, frequently constituting the sum total of symptoms presented.

The primary form is rapidly fatal; if sloughing occurs promptly, recovery may take place, but with a strong tendency to assume the chronic form. Death in either form is preceded by profound prostration of the vital forces, low, muttering delirium, and coma; consciousness may be retained to the end.

The *Chronic form* is marked by "atrophy of the glandular structure and hypertrophy of the wall of the bowel" (Whittaker). Ulceration in various stages of development or healing is frequently, though not always, present. The mucous membrane generally is rough, irregular and pigmented, steel-

gray or black; the presence of cicatrices gives to it a puckered appearance. The submucous structure and the muscular coat are hypertrophied, thus reducing the calibre of the intestine. Strictures occur rarely. Cystic degeneration of the glandular elements may be present.

Symptoms.—Chronic dysentery commonly follows an acute attack; the amœbic form may be subacute from the beginning.

The chief difference, symptomatically, from the acute form lies in the absence of tormina and tenesmus and of blood and shreds in the stools. Mucus, in varying amounts, is frequently seen in the stools, especially when a stubborn constipation alternates with diarrhœa.

Usually there is a thin, frothy diarrhœa, the stools containing particles of food, more or less freely tinged with bile, their number varying from four to twelve, or more, in twenty-four hours. The appetite is fitful, digestion deranged, intestinal flatulence pronounced, and there is tenderness along the course of the colon. The tongue is usually red, beefy; later, dry and cracked. Anæmia, great weakness and extreme emaciation are common features. Acute exacerbations may occur; if so, the symptoms will resemble those of the acute form; or, owing to the general lack of tone, intercurrent disease, such as pneumonia or tuberculosis, may at any time seriously complicate the case.

Complications and Sequelæ of Dysentery.—Complications are infrequent. Those most liable to occur are: *Malaria and typhoid fever*; neither exert any marked influence upon the course of the dysentery, nor are they frequent in private practice. *Rheumatism* (arthritis of the knee and other joints) may set in during the second week of dysentery or during convalescence, usually continuing from four to six weeks. *Pleurisy, pericarditis and endocarditis* are seen in severe and protracted cases. *Pyæmia* is occasionally observed, and *anæmic œdema* has been noted where the anæmic state was very pronounced. *Local peritonitis* may occur from extension, and *diffuse peritonitis* from perforation (perityphlitis, periproctitis). *Gangrene* of the intestine is sometimes an early complication; it is recognized by the symptoms of collapse. *Abscess of the liver* has been seen in this country, and is very common in the tropics. *Paraplegiâ*, from neuritis, follows occasionally;

corneal ulceration is even more rare. *Intussusception* and *prolapse* may result from excessive straining, especially in children.

Perfect recovery from the *chronic* form is rare; in the great majority of such cases digestion remains permanently impaired and there is left a persistent irritability of the bowel which becomes the source of much discomfort.

Diagnosis.—Generally the diagnosis of dysentery is easily made, the presence of tormina, tenesmus, characteristic stools and rapid exhaustion of the patient establishing the nature of the case. This applies especially to the follicular form, save in isolated sporadic cases, in which prompt recognition of the disease may be attended with difficulty. The amœbic form is recognized chiefly by the chronicity and irregularity of its course and by the presence of the amœbia dysenteria.

Diarrhœa at times bears some resemblance to dysentery, but has no marked persistent tenesmus and lacks the characteristic stools; it usually runs a shorter course and yields more readily to treatment. *Choleraic* conditions are distinguished by the suddenness of their onset, the profuse character of the vomiting and stools, and the cramps and tendency to collapse.

Cancer or *syphilis of the rectum* may have considerable tenesmus, and the stools may be dysenteric in character; but the course of the disease, the absence of other symptoms peculiar to dysentery and, above all, careful examination of the rectum will reveal the nature of the affection. *Intussusception*, in children, presents many symptoms which might mislead, particularly early in the case; among these are: vomiting, mucous and bloody stools, with tenesmus, restlessness and prostration. Later, however, the invaginated mass can be recognized, especially in the right iliac and hypochondriac region; the pain and vomiting also are more persistent and severe. *Typhoid fever* resembles certain cases of dysentery, especially of the diphtheritic form; but the marked character of the nervous symptoms of the former is absent in the latter; typhoid fever has a characteristic temperature curve, the fever of dysentery is irregular and intermittent; the stools of typhoid fever resemble pea-soup, those of dysentery are characteristic as described; typhoid fever has epistaxis, enlarged spleen, and certain complications (bronchitis) which are not seen in dysentery.

Duration and Prognosis.—The duration of the average case of the catarrhal or follicular type is from eight to ten days after the establishment of the dysenteric symptoms. The epidemic form may continue for weeks or months; chronic cases, for months and years.

Death results from asthenia or from complications; exceptionally a fatal termination is reached within a few hours.

The prognosis in the lighter forms is good; children and old people furnish a somewhat higher rate of mortality than those in early adult life. Epidemics vary greatly in severity and fatality; in the less fatal epidemics an average rate of mortality of 5 to 10 per cent. obtains; but the loss has in many instances reached from 60 to 80 per cent. The great fatality of some epidemics is undoubtedly due to specially unfavorable conditions, as bad food, confinement in bad quarters, great mental depression, etc.; it is thus that the frightful rate of mortality among prisoners of war and soldiers in badly arranged and badly situated camps, with their necessary exposure, unwholesome food and depressing influences, is largely explained.

One attack affords considerable immunity from others.

Treatment.—Prophylaxis consists of attention to wise living and obedience to sanitary laws. Tropical countries require special precautions which need not be considered here. The wants of large bodies of men, congregated in camps or prison, must be studied and supplied by those in authority.

The individual case requires careful attention. The patient should be isolated in a room having an abundance of fresh air. Perfect rest in a horizontal position, from first to last, must be strictly enforced. In severe cases an attempt to assume the erect position is often followed by nausea and fainting, and must be prevented; in fact, the use of a bed-pan or of clothes in the bed, as receivers of the stools (the latter to be burnt as soon as soiled) is often imperative. The patient, for obvious reasons, should be urged to resist as long as possible the desire to empty the bowel. Cleanliness about the person of the sick must be scrupulously maintained. Clothes used must be dry, warm, promptly changed whenever soiled, then burnt. It is well to bathe the parts after the bowels have moved, using soft clothes and pure, non-irritating soap. Vaseline, slightly carbolyzed, is serviceable when the parts are chafed. Mild disin-

fectants and deodorizers may be used about the person of the sick and in the room, but cannot take the place of fresh air and cleanliness. The stools must be removed at once; if not burnt, they must be buried deeply and at a safe distance from the wells and house. *Drink* may be given with reasonable freedom, as the patient desires and tolerates it. The water should be pure, boiled, then cooled, and given in small amounts and at frequent intervals. If not kindly borne, crushed ice, in moderate amounts, may be substituted. Carbonized water and acidulated drinks (lemonade) should be used with caution, but in many cases are grateful and harmless.—*Diet*. Milk constitutes the most useful article of diet; in the majority of cases it acts best when boiled. If taken freely, watch must be kept upon the evacuations, the appearance of curdy or oily matter in the stools indicating the necessity of at least temporarily discontinuing its use. Whey, meat-broths, oysters, egg-albumen or scraped raw beef may be added or substituted. It is well to be somewhat influenced in the selection of the diet by the wishes or craving of the patient and by his habits of life. Of course, every departure from a line which experience has shown to be expedient and safe entails the necessity of increased watchfulness; yet, the extreme exhaustion common in dysentery warrants a constant effort on part of the physician to supply all the nourishment which can be properly assimilated. Stimulants are often demanded and kindly borne, especially in the latter part of the disease; milk-punch, with brandy or whisky, or wine, are usually relished, bracing and without ill effects.

The patient beginning to show signs of improvement, there is an increased desire for food which justifies, on one hand, a little more freedom in the choice of food—as the addition of egg, rice, fowl, etc.,—but, on the other, it necessitates the exercise of especial watchfulness to avoid overfeeding or committing serious errors. Ripe fruit and vegetables may be added to the dietary as the patient has fully entered upon convalescence. In *chronic* dysentery, extreme care in diet is absolutely necessary, the slightest mistake often giving rise to violent aggravations or relapse.

The distressing tormina and even the tenesmus may be greatly relieved by the use of small, thin injections of starch, to which from thirty to sixty drops of laudanum have been added.

The chief reliance of the dominant school at present is copious irrigation of the bowel with water—cool, tepid, or at a temperature of 100°—to which silver nitrate (from 10 to 30 grs. to the pint), alum (60 grs. to the pint), acetate of lead, or some other astringent, has been added. “It changes a huge internal into an external abscess, and enables us to cleanse the bowel of its putrid contents” (Hare).

Therapeutics.—The remedies most frequently indicated are: MERCURY, ARSENICUM, BELLADONNA, COLOCYNTHIS, IPECACUANHA, ARGENTUM NITRICUM, LACHESIS. Of these, MERCURY is by all means the most valuable.

MERCURY. The abdominal pain is severe, cutting, griping, constant; there is incessant and largely ineffectual straining, the patient having not a moment's rest from the pain in the bowels and the desire to go to stool; tenesmus often is agonizing. The pains are severe before stool, and continue to increase until an effort at stool is made; this effort aggravates the suffering, but the straining cannot be controlled; expulsion of a small stool and cessation of straining brings no relief, rather a continuance of the aggravation, but after a little time a brief period of comparative rest follows. The stools at first are slimy, green, bloody (MERC. SOL. HAHNEM.), later they grow more frequent, become very scanty, and consist chiefly of bloody mucus and membranous shreds. There is urinary retention or suppression. In the early stage, when the inflammatory symptoms are intense, the exhibition of MERCURIUS CORROSIVUS in the 3d dec. trit. is often followed by immediate improvement and early recovery; it has also done good work in advanced cases, with symptoms of gangrene.—BELLADONNA is a useful remedy, particularly in children, when the stools are greenish, slimy, bloody, accompanied with much bearing-down and tenesmus, followed by smarting and burning in the rectum and anus. The abdomen is hard, swollen, sensitive to pressure; intense colicky, pinching pains in the abdomen cause the patient to scream out; there is sense of fulness in the rectum and anus, with swelling and bulging out of the anal mucous membrane. Urine profuse, more often suppressed. Great restlessness and nervous excitement.—ARSENICUM, in addition to its characteristic restlessness, thirst, and exhaustion, has: watery, yellowish, foul stools; chocolate-colored stools; bloody stools,

containing pus, shreds, bits of fæcal matter, fluid or coagulated blood, dark, almost black. The stools are preceded by cutting pain and restlessness; they are followed by burning pain in the rectum and great exhaustion. The face is sunken; the skin dry and hot, or there is clammy coldness of the entire surface. The pulse is weak and rapid. It is of great service in severe cases when there is extensive breaking-down of tissue.—**COLOCYNTHIS** is an excellent remedy when the patient suffers severely from griping, colicky pains extending from the navel downward, and relieved by pressure and “bending double.” The stools are frequent, contain mucus and blood, are accompanied with considerable straining and tenesmus, and are followed by a sense of great relief which continues for several minutes. It lacks the intensity of inflammatory action which belongs to **MERCURY** and the profound constitutional depression of **ARSENIC**.—**IPECACUANHA**, like **MERCURY**, has been highly recommended by clinicians of the dominant school, especially in the dysentery of the tropics. Given in minute doses it is useful in children oftener than in adults, particularly when the disease is brought on by eating unripe fruit. The stools are dark-green, full of mucus, frothy, accompanied with violent colic and tenesmus. There is much gastric derangement, moist, yellowish-white tongue, loathing of food, and nausea and vomiting.—**ARGENTUM NITRICUM** is one of the best remedies in advanced cases when the evacuations are shreddy, ropy, green, with slight admixture of blood, burning soreness and constriction in the abdomen, and severe cramp-like, constrictive pain in the rectum.—**LACHESIS** has dark, slimy, chocolate-colored stools, of foul, cadaverous odor, which look like charred straw; they are passed with much painful straining and burning at the anus. Great prostration of the vital forces; typhoid condition.—**ACONITE** may prove serviceable when the first symptoms are characteristic fever, restlessness, thirst, and general arterial tension.—**RHUS TOXICODENDRON** is useful, especially in children, when the discharges are of the consistency of jelly or like the washings of meat; there is tearing pain down the thigh, with uneasiness and relief from changing position or moving about in bed. **PODOPHYLLUM**, **ALOE**, **APIS** (in chronic cases, with annoying urging and frequent discharge of gelatinous mucus, without much tenesmus), **BAPTISIA** (remarkable prostration,

quite out of proportion to the severity of the case, pain in the limbs, fever with much weakness, brown, dry tongue), *CANTHARIDES*, *FERRUM PHOSPHORICUM*, *NUX VOM.*, *ACID. NITRICUM*, *KREASOTUM*, *BRYONIA* and *CHINA* should also be consulted.

TUBERCULOSIS.

An infectious disease due to the presence of the bacillus tuberculosis (*b. Kochii*), occurring in firm nodular bodies called tubercles or in diffuse infiltration of tissue, resulting in caseation or in sclerosis, with a tendency to ulceration, at times calcification. The disease may attack almost any organ or structure of the body; in adults it most frequently affects the respiratory organs, and is then known as pulmonary tuberculosis, phthisis pulmonalis, pulmonary phthisis, consumption.

Ætiology.—Tuberculosis is widely distributed. It spares no race or age, and is said to have a larger death-rate—about one-seventh of the total mortality—than any other disease. Negroes are very susceptible to tuberculous processes; among the American Indians, even though living in salubrious climates, the ravages of consumption are so extensive as to threaten the extinction of the race from this cause alone. The U. S. census of 1880 shows a ratio of 166 among the whites, 186 among the negroes, 286 among the Indians.

Geographically, the distribution of the disease is general; it is rare toward the poles and in high altitudes; it thrives best in large centers of population, with coincident insanitary conditions.

The disease also affects animals, among them chiefly cattle and fowls; hogs and sheep suffer from it less often, and horses are comparatively free from it. Pets about the house, as cats and dogs, readily become affected from association with tuberculous people, and in turn may convey the disease to others. Wild animals in a state of nature seem to be free from tuberculous disease; in captivity they often die of consumption.

The specific cause of the disease is the bacillus tuberculosis (*b. Kochii*). It occurs in slender rods, of the length of one-third to almost one-half of the diameter of a red blood corpus-

cle; slightly curved or straight, and "uniform throughout its length, except where it is apparently broken by intervening highly refracting spherical spaces, four to eight in number, which are regarded as spores," and which by others are considered the result of uneven staining. It is invested by a very dense membrane, and is capable of resisting for a considerable length of time heat and other destructive agents. It lives, but does not multiply, outside of the human body, thrives in the human body and in that of several warm-blooded animals, and grows on *blood-serum*, glycerin-agar and potato, kept at blood heat. The growth is slow, appearing at the end of the second week, forming "thin, grayish-white, dry, scale-like masses on the surface of the culture medium." Staining is necessary for the study of the bacillus. Ehrlich advises the following method: "Add 5 cc. of pure aniline oil to 500 cc. of distilled water; shake, and filter to remove the excess of oil. To this aniline water add 11 cc. of a saturated solution of fuchsin and 10 cc. of alcohol. Sputum may be readily examined by placing a minute quantity of it between two cover glasses and spreading it into a thin layer by pressure. The glasses are now to be separated by a sliding movement and dried. Then place the cover glasses in the staining material for twenty-four hours or, if more rapid results are desired, into a quantity of the stain which has been raised to the boiling point, the hot fluid coloring satisfactorily in a few minutes. The stain is next removed from all but the tubercle bacillus by washing for a few seconds in a mixture of nitric acid and distilled water (1-4), the acid is to be immediately removed by washing once or twice in distilled water. If it is desired to examine the specimens in Canada balsam, the cover glass must be first placed in 95 per cent. alcohol for a few minutes; but if glycerin is used, this step is not necessary." (Goodno.)

It is stated that sputum is nearly a pure culture of the bacillus of Koch, and that, even when diluted 1:400,000 times, it is still capable of propagating tuberculosis in animals especially susceptible to the disease, as guinea pigs or rabbits. The number of the micro-organisms thrown off in the sputum is enormous; thus Nuttall, quoted by Osler, from a patient moderately advanced in tuberculosis estimated that in sixteen counts, made during a period of about six weeks, there were

thrown off from one and a-half to four and one-third billions of bacilli.

The bacilli are present in all tubercular lesions, especially during a period of acute development; the more chronic the process, the smaller the number of bacilli present, particularly when seated in the joints or lymph glands. In some old lesions culture or inoculation are required to demonstrate their presence.

Infection may be brought about in various ways. Most frequently the disease is transmitted through the *inhaled air*, particles of dust floating in it, affording abundant lodgment to the many bacilli set free by the drying-up of expectorated sputum. The fact alone that in the large majority of cases the respiratory organs are primarily the seat of the tuberculous affection strongly argues in favor of this view; it is further emphasized by the prevalence of tuberculosis among those who live a strictly in-door life, as in cloisters, prisons, etc., or who, like professional nurses, are in close contact with consumptives. Statistics have been offered to disprove this assertion, as from the Brompton Consumption Hospital, but they only demonstrate the efficacy of such protection against the infectious agent as is afforded by good sanitation and special care. Experiments made by Cornet, and others, have positively proved the danger arising from the infectious character of the *dust on walls of the rooms occupied by tuberculous patients*, even for a period of six weeks after death, and series of fatal cases have been traced to infected houses or rooms and berths on steamers and sleepers. The commonly accepted belief that the expired air of tuberculous patients may transmit the infection does not rest upon facts.

To what extent *hereditary transmission* exists has not yet been determined. That in rare instances tuberculosis occurs congenitally in man is undoubtedly true; but the very fact that such cases are almost isolated possesses great significance. Authorities incline to the belief that in the majority of cases in which the possibility of hereditary transmission may be considered there is a "prolonged latency" of the virus, ready, upon slight provocation, to become active. The case of Birch-Hirschfeldt, who found that portions of the viscera of a fœtus born of a phthisical mother, though containing no tubercles,

were infective to guinea pigs, is very suggestive. Baumgarten argues that the virus is transmitted, but that the disease may not show itself until a considerable period of time has elapsed, and in proof of this he refers to the frequency with which tuberculosis is seen in sucklings and to the occurrence of tuberculosis in regions of the body practically beyond the reach of accidental infection, as in the bones and joints.

That nearly every tubercular disease has a history of seemingly inherited tubercular tendency is a well-known fact; it should not be forgotten that the frequency and the extensive distribution of tuberculosis alone largely explains this, not to consider the important item of constant exposure to accidental infection on part of the possibly non-tuberculous children of parents dying from tuberculosis. Yet, direct transmission of the disease from parent to child, especially from the mother, seems an established fact.

Inoculation by tuberculous matter was first demonstrated by Villemin (1865). It is now accepted as fully proved that tuberculous matter is the only agent which by inoculation can produce tuberculosis. Persons who are brought in frequent contact with dead bodies or animal products, such as demonstrators of morbid anatomy, dealers in hides, etc., suffer from this form of tuberculosis. It usually remains local, but may give rise to constitutional infection. The "Leichen tubercle" or "post-mortem wart" is a case in point. Other modes of inoculation arise from the use of articles which have been about the person of a consumptive, either ornaments (as, for instance, ear-rings) or wearing apparel; injuries, such as a cut inflicted with a broken dish used as a container of tuberculous sputum; lips of a tuberculous person coming in contact with an abraded surface, as during the Jewish ceremony of circumcision or, as occurred in a case under my observation, of a tuberculous person sucking a wound inflicted upon the body of a friend by a snake-bite. B. F. Gamber relates the case of a young infant, evidently in perfect health, accidentally getting hold of and sucking a handkerchief saturated by tuberculous sputum, and dying within a few weeks of acute tuberculosis.

Infection by the milk of tuberculous cows is no longer a matter of doubt; experiments upon a large scale are conclusive upon this point. Tubercular mammitis in the cow need not be

present, and yet bacilli may occur abundantly in the milk. Pigs fed upon such milk soon become tuberculous. Osler points out that the remarkable frequency of intestinal and mesenteric tuberculosis in children probably finds its explanation in this mode of infection. Infection through the use of *tuberculous meat* is also possible, but is greatly lessened by the thorough cooking to which meat usually is subjected.

Among the *predisposing* causes most writers recognize the existence of a constitutional bias toward tuberculosis which defies description. The old-time pictures of the ill-shaped, narrow, flat chest as indicative of the so-called consumptive habit have ceased to be satisfactory since the profession have learned that almost as often those of expansive and well-rounded chest fall victims to this disease, and that a sunken chest-wall more frequently is a proof of actually existing tuberculosis.

Any condition which lessens the integrity of any portion of the respiratory apparatus or its powers of resistance may be considered a predisposing cause. It is thus that catarrhal inflammation, especially bronchial catarrh, assumes an importance which it could not have save in its relation to tuberculosis, a relation so obviously close that even the masses recognize the danger of "letting a cold run." It is in the same light that a narrow, flat chest is to be looked upon with suspicion, as indicating, if not a tuberculous condition, at least the probability of an inherent weakness or lack of development of the pulmonary tissue. In the same manner traumatism, accidental or from an operation, or any disease which may reduce the vitality of the pulmonary tissue, such as pneumonia or bronchitis, may become a predisposing cause. Operative treatment of tuberculous lesions, as resection of a tuberculous joint, may result in general tuberculosis. The constant *inhalation of air charged with particles of dust* or other irritating, finely divided substances has the same effect, setting up local irritation and circumscribed inflammatory action, eventually resulting in a respiratory apparatus so weakened that the infectious matter need only be introduced to thrive abundantly. Hence the startling mortality from tuberculosis among laborers whose occupation involves such exposure. It is stated upon good authority that of glass-workers, 80 per cent.; of needle-sharpeners, 70 per

cent.; file-cutters, 62 per cent.; and stone-cutters, 60 per cent., die of pulmonary consumption. Specific fevers, by lowering vitality and impairing nutrition, and fevers associated with bronchial catarrh, as measles, are, for a similar reason, often followed by tuberculosis.

Soil and locality bear no direct relation to tuberculosis, save as dampness predisposes to catarrhal affections, and they, in turn, predispose to tuberculosis. No age is exempt, but in childhood the lymphatic glands, bones, and meninges are most commonly involved. In young children the mesenteric and bronchial glands are particularly prone to tuberculous disease, and the meninges are especially liable to the affection. In adults, pulmonary tuberculosis is not only the commonest form of the disease, but it is rare to find a case of general tuberculosis in an adult without involvement of the lung.

"The tuberculous process."—The nodular tubercle at first presents no truly characteristic feature. The distinctive changes due to the presence of the bacilli and occurring later are summarized by Osler as consisting of "a proliferation of the fixed elements, with the production of epithelioid and giant cells; and, secondly, an inflammatory reaction, associated with exudation of leucocytes." The tubercle, in due time, undergoes caseation or sclerosis.

Coagulation necrosis begins in the center of the growth, resulting in the formation of a homogeneous, structureless mass, no longer susceptible to staining, extending from the center toward the circumference, and eventually converting the tubercle into a yellowish gray body, void of blood-vessels, containing bacilli. This constitutes the *cheesy* degeneration of the tubercle, which finally terminates in softening, fibroid limitation (encapsulation), or calcification.

Nature attempts to preserve the integrity of adjoining structures by restricting this process by means of hyaline transformation, with a marked increase in the fibroid elements, carried on with especial activity in the outer zone of the involved tissues, practically encapsulating the area of broken-down tissue. Thus there is going on at the same time in each tubercle a double process, one destructive and dangerous, the other conservative and life-saving; the issue of the case depends upon the preponderance of one of these. If capable of effectively restrict-

ing, by sclerosis or encapsulation, the growth of the bacilli-laden tubercle, life and usefulness may be prolonged.

The tuberculous lesions may involve the various tissues of the body, but show a preference for the connective tissues. Should the bacilli per-chance enter the blood-vessels or lymph channels, their distribution becomes general throughout the body.

The so-called *diffuse, infiltrated tubercle*, commonly found in the lung, is to all intents and purposes a fusion of many small, at times microscopic, foci of infection, with a tendency to rapid caseation, involving areas of varying extent, usually occurring in groups of lobules, sometimes involving an entire lung. The term "gray infiltration" of Lænnec is used to describe the gray, gelatinous appearance of the affected parts in the early stage. The term "cheesy pneumonia" covers a more extensive infiltration, with large areas of caseation. This infiltration may be so diffuse, without any special foci, as to practically constitute a true tubercular pneumonia.

Secondary inflammatory processes are a natural sequence. If of moderate intensity, there is that formation of cicatricial connective tissue which "constitutes the conservative element in the disease." If severe, exudation of leucocytes and serum results, and the tuberculous growth may be surrounded by an area presenting all the histological features of a true pneumonia.

The suppuration which so commonly occurs in connection with tuberculous processes is held to be due to mixed infection. It is, however, admitted that the tubercle bacilli, and especially their products, are in themselves capable of exciting suppuration.

ACUTE MILIARY TUBERCULOSIS.

An eruption of miliary tubercles affecting the different structures and organs of the body, preferably the pleura, peritoneum, lungs, lymphatic glands, liver, spleen, kidneys, and cerebral meninges; at times they are equally distributed throughout the body; again, they are massed in one organ and scarce in the others.

Acute miliary tuberculosis may arise from any of the causes to which is attributed the appearance of the disease in any other form. There is, however, a growing tendency to the be-

lief that in very many cases, perhaps in the majority of cases, this form of tuberculosis is due to auto-infection, starting from some focus of tubercular disease which has existed without being recognized, as in the lungs, lymph-glands, or elsewhere. The rupture and subsequent discharge of a tubercular mass into a vein or into some lymph-channel is sure to scatter the bacilli broadcast throughout the system and to bring on general infection.

Three types are distinguished: the typhoid form, the pulmonary form, the meningeal form.

THE TYPHOID FORM.

This form consists of a general infection, with constitutional symptoms which so closely resemble those of typhoid fever that, often, a differential diagnosis becomes difficult. In exceptional cases the onset is abrupt; usually, indisposition, loss of appetite, slight feverishness, and sense of weakness are noted. Shortly the fever becomes pronounced, with, commonly, evening rise in temperature and remissions in the morning; the pulse-beat is weak, rarely dicrotic, corresponding in rapidity to the height of the fever; the tongue is dry and brown; there is flushing of the cheeks; delirium; more or less pronounced bronchitis, with increased frequency of respiration; considerable nervous involvement; constipation, at times diarrhoea, rarely with admixture of blood; enlargement of the spleen and albuminous urine are generally present; occasionally there is seen jaundice, herpetic eruptions, and petechiæ, the latter especially about the wrist.

The *fever* is irregular. The temperature in the evening may rise to 103° or 104° F., and even as high as 106°; in the morning a marked remission is observed, sometimes even a fall to below normal; at times this order is reversed and the highest temperature reached in the morning. Afebrile cases have also been observed. Exceptionally, severe night-sweats and sudamina are persistent.

The nervous symptoms may be well-pronounced, consisting of delirium, which is rarely active, with a tendency to mental dullness drifting into a fatal coma.

Symptoms of bronchitis are almost always present, very much as they are observed in typhoid fever. Occasionally the

pulmonary involvement is extensive, and then impresses its symptomatology upon the form of the disease, increasing the respiratory movements and pulse.

Diagnosis.—As stated, the differentiation from typhoid fever is often exceedingly difficult. The diagnosis of acute tuberculosis rests upon the greater frequency of respiratory movements; the comparative infrequency of cough; pronounced diarrhœa and jaundice; the more moderate enlargement of the spleen, which occurs later than it does in typhoid fever and is more pronounced in children than it is in adults; the absence of roseola; the irregularity of the fever; the absence of the characteristic temperature curve of typhoid fever; and the presence of leucocytosis. Bacteriological tests may be required to make the diagnosis positive.

The *duration* of the disease is from a fortnight to six weeks, or longer.

The *prognosis* is unfavorable.

THE PULMONARY FORM.

Two classes chiefly furnish the victims of this type: persons who have been chronic sufferers from some pulmonary lesion, not necessarily tuberculous, and children who have just passed through an attack of measles, whooping-cough, or some severe infectious disease.

The symptoms are almost always those of a severe bronchitis, with hard cough, muco-purulent, sometimes rusty, expectoration, occasionally bleeding, and dyspnœa which sets in early and attracts attention because it is quite out of proportion to the physical signs developed. Breathing is hurried, reaching in adults from fifty to sixty, and in children as many as eighty, or more, respirations per minute. Cyanosis is pronounced throughout the course of the disease.

Examination of the chest at this time gives the physical signs of bronchitis, more or less diffused, or of a broncho-pneumonia. In some cases no characteristic signs can be detected. Percussion yields dullness at the bases, sometimes areas of hyperresonance. Auscultation determines crepitation sounds, due to the presence of tubercles on the pleura, or râles of a sibilant or fine crepitant character. There may be high-pitched tubular breathing at the bases or toward the root of the lung. As the

disease progresses, large mucous râles are easily detected; the temperature rises to 102° or 103°; the pulse is rapid and feeble; derangement of the appetite, with vomiting and indigestion, persist; and enlargement of the spleen is present in cases that run a rapid course.

Death usually occurs from general infection, exhaustion, heart failure or pulmonary œdema.

The diagnosis presents no special difficulty. The history of the case alone usually furnishes the key to the nature of the disease. The early and marked dyspnœa, in connection with the pulmonary symptoms and the pronounced tendency to cyanosis, are almost characteristic. The presence of bacilli is, of course, of the highest diagnostic importance.

The duration of the disease varies; death may occur within a few weeks or the case may linger for months.

The prognosis is unfavorable.

THE MENINGEAL FORM.

This form will be discussed in a subsequent chapter (see Organic Diseases of the Brain; Affections of the Meninges).

Treatment.—The prophylaxis and treatment of all tubercular affections is necessarily the same, save as it must be modified by the exigencies of each particular form. They will be discussed in full under pulmonary tuberculosis, the form most frequently met in general practice. In the same chapter therapeutics will be discussed. The *typhoid form* requires the same careful attention to feeding which is practiced in the treatment of typhoid fever. Small amounts of milk are to be administered at frequent intervals. Koumyss, peptonized milk, soups, beef-tea, broths, gruels, and other easily digested and nourishing substances may be given in small amounts and at short periods. If tolerated, alcoholic stimulants may be used in moderation, especially iced champagne when the stomach is irritable. Bits of broken ice may be allowed to quench the thirst; ice-cream, a grateful means of conveying nourishment and of relieving the heat and dryness of the feverish mouth and throat; sponging in hot or cold water; alcohol baths; inunctions with cod-liver oil or pure olive oil; various methods of artificial feeding—all these are to be employed as occasion for their use arises.

Remedies must be prescribed symptomatically, and those

most likely to prove of service will be found in the chapter on typhoid fever; of these, ARSENICUM is one of the most reliable.

The *pulmonary form* requires the treatment and general management given in full under pulmonary consumption.

TUBERCULOSIS OF THE LYMPHATIC GLANDS.

(*Scrofulosis or Struma.*)

It is generally conceded that the presence of Koch's bacillus constitutes "the essential element" of this disease. Several important clinical features of the scrofulous affection, as its tendency to remain localized and its self-limitation, have not yet been satisfactorily reconciled to this ætiological theory, save as the experiments of Arloing and Lingard tend to prove that the virus, here, is much less active than that which produces the true tubercular process.

Donkin describes scrofulosis as "a largely hereditary tendency to congestion and inflammation of various parts and organs, which is especially marked in the lymphatic structures and glands. Imperfect nutrition and circulation underlie these morbid expressions, which are seen chiefly in children born and reared in bad hygienic conditions, with, frequently, a vicious heredity as well. Parental syphilis and phthisis underlie struma in numerous cases, while bad food and the deprivation of pure air and light are probably guilty of many more. Tonsillar enlargement, with recurring inflammation, is a common mark of this condition, mostly accompanied by a similar affection of the glands of the neck. These glands may only swell and after a while subside, but frequently suppurate, and then nearly always become more or less caseous. In close connection with this glandular affection we find disease of the bone, swelling of joints, and various affections of the skin and mucous membranes." To the predisposing causes enumerated by Donkin should be added that "increased vulnerability of tissue" (Virchow) which results from chronic or often recurring catarrhal inflammation of the mucous membrane.

The most characteristic features of tuberculous lymphadenitis are: Remarkable chronicity; tendency to remain localized, although, until thoroughly healed, a focus of tuberculous adenitis may at any time become the source of general tuberculous in-

fection; predisposition to slow, spontaneous healing; tendency to suppuration.

Clinical Forms.—*General tuberculous lymphadenitis* is very rare. It consists of a general tuberculous involvement of all the lymph glands of the body without, or with little, tuberculous involvement of other parts. It shows a preference for the mesenteric and retro-peritoneal glands, and often affects the bronchial and, sometimes, groups of external, glands. When occurring in an acute form it resembles Hodgkin's disease. As stated, in an overwhelming majority of cases the disease is local; it then involves the cervical, the bronchial, or the mesenteric glands.

a) *The cervical form.*—This is the form commonest seen in children, especially among the poor, badly housed and badly fed; it is frequent in foundling asylums and similar institutions, and shows a preference for the negro. Nasal and pharyngeal catarrh, enlarged tonsils, catarrhal affections of eye and ear (purulent otitis), and eruptions of the scalp or skin are likely to be associated with it.

Slight enlargement of the maxillary glands ("kernels"), larger on one side, gradually increases until it becomes a firm, smooth, isolated tumor or hard, knotted mass, upon which the skin usually is freely movable. In other cases, with a higher degree of inflammatory action, the skin adheres. The tendency is to suppuration, which develops tardily; if allowed to burst, there is left a sinus which it may require an indefinite length of time to heal.

The entire process is exceedingly tedious. Anæmia may become well pronounced when suppuration continues long, but even in serious uncomplicated cases the prognosis, as to life, is favorable. Some fever is present during the progress of the case, with general indisposition, loss of appetite and marked debility. If inflammatory action is active and the process more than usually intense, the fever is correspondingly high.

Other glands may become involved. Thus, the supraclavicular glands and those of the posterior cervical triangle may be affected. Or the cervical and axillary glands may become enlarged, forming a continuous chain, which extends beneath the clavicle and pectoral muscle. The bronchial glands, also, may be involved, greatly adding to the gravity of the case, for the

more extensive the involvement, the greater the danger resulting from cachexia and of extensive, possibly general, infection. Thus, the enlargement of the supraclavicular and axillary glands on one side is very liable to result in tuberculous infection of the pleura or of the pulmonary tissue.

b) *The bronchial form* also is of frequent occurrence, a fact which is probably due to the readiness with which the mediastinal glands about the bronchi catch the accidentally inhaled tubercle bacilli. The tumors may be large and suppurate. There is here especial danger of infection of the pericardium, of the lungs, and of the system generally.

c) *The mesenteric form*, also called *tabes mesenterica* or abdominal scrofula, consists of enlargement and caseation, more rarely calcification and suppuration, of the mesenteric and retro-peritoneal glands. It may be primary or secondary. The former is associated with intestinal catarrh; the latter is an incidental feature of general tuberculosis of the intestine or, more particularly in adults, of pulmonary tuberculosis.

Children oftener than adults suffer from this form. The symptoms are chiefly those of innutrition, progressive loss of flesh, strength and energy, fever of moderate intensity, anæmia, enlarged and tympanitic abdomen, diarrhœa of thin, offensive stools, and constantly increasing, pronounced debility.

The great distension of the abdomen renders it very difficult, if not impossible, to detect the enlarged glands; should the peritoneum become involved, as it occasionally does, the abdominal wall is firm and comparatively unyielding, and the nodules may then be readily felt.

Treatment.—The *prophylaxis* of scrofulosis consists of measures to modify and eradicate the inherited predisposition. Even during early infancy careful attention should be paid to every expression of the scrofulous tendency. Soft woollen underwear of full length, adapted in weight and thickness to the season of the year, must be worn to prevent sudden chilling of the surface of the body and catarrh of the respiratory mucous membrane. Irritation of the skin, chafing, etc., is to be avoided by thorough attention to the toilet of the infant or child. Regular sponging in a warm room is commendable, but too frequent bathing, especially in a bathtub, or bathing in water of a low temperature, must be avoided, since it is liable

to exhaust vitality rather than stimulate. If old enough, sea-bathing is excellent; in small children, or when sea-bathing cannot be had, a salt-water sponge-bath may be substituted. Change of climate, permanent or for a considerable period of time, is desirable; this implies an out-door life away from fashionable hotels and from places where the patient is constantly subjected to danger from tubercular infection. Diet is of importance. If an infant, it should be fed at the breast; if for some special reason suckling is out of question, a compromise in the way of artificial feeding must be made. Meigs offers the following excellent formula: One quart of good ordinary milk is placed in a high pitcher or other vessel, and allowed to stand in a cool place for three hours; then one pint is slowly poured off from this, care being taken that the vessel is not agitated, the object being to obtain the upper layer of the fluid, rich in fat, and leave the lower, comparatively poor, portion behind. When the child is to be fed, there are taken of this weak cream three tablespoonfuls, of lime-water two tablespoonfuls, and of sugar-water three tablespoonfuls, the sugar-water being made in the proportion of eighteen drachms of milk-sugar to a pint of water. The usual precaution as to absolute cleanliness in the apparatus used for feeding must be observed, and the lime-water may be diluted when its presence renders the milk distasteful to the child. As the little patient grows older, and takes food more freely and in greater variety, milk still heads the list; care should be had to procure it from a healthy cow; if obtained from the city-milkman, it may be well to sterilize it. Well-cooked cereals; bread at least twenty-four hours old, and in due time broths may be added to the dietary. Fat, in moderate amount, is highly advantageous; cream, olive oil and cod-liver oil should be used freely but wisely, always taking pains to discontinue, at least temporarily, anything that is distasteful or distressing. By attention to these suggestions and by taking pains to have the growing child live a thoroughly normal life, the scrofulous tendency may be so completely modified that it ceases to be a source of danger in after-life.

Therapeutics.—The remedies oftenest indicated in the early stage are *CALCAREA CARBONICA* and *BARYTA CARBONICA*. The indications for both are generally known. The former corres-

ponds closely to all the constitutional expressions of the scrofulous diathesis, and, perseveringly used, has done much valuable work; the latter, almost as profound in its action, has been of particular service when a stubborn tendency to naso-pharyngeal catarrh existed in children of scrofulous tendency.

When the glandular swelling has become persistent and prominent, BELLADONNA, ASA FÆTIDA, CONIUM, and IODINE are to be consulted.—BELLADONNA acts best in children who are subject to attacks of congestion in different parts of the body, energetic, and of full, plethoric habit. The swelling is hard, more than usually sensitive to the touch, with a tendency to comparatively rapid inflammation and suppuration. The characteristic redness, with red streaks radiating from the center outward, is sometimes noticed.—ASA FÆTIDA is useful in "scrofulous, bloated, clumsy children, of phlegmatic temperament," when the glands are hot, hard, with throbbing, shooting pain. Gilchrist has found it of service when fistulous openings had formed, with stinging pains in the parts, changed in character by touch, and with dark-colored discharge of putrid, cadaverous odor.—CONIUM: the glands are of stony hardness, sometimes painless, again with darting, stitching pain; shooting, drawing pain in the tonsils; scraping in the throat; constant hawking; sense of constriction in the throat, as from tightness of the shirtband. Sensitiveness and sticking pain in the region of the liver. Gripping, sticking, knife-like pain throughout the abdomen, which is much distended. Watery diarrhœa.—IODINE: chronic catarrh, with swollen, painful nose and fetid discharge; aural catarrh, with deafness; children of dark complexion and ravenous appetite, who remain thin and scrawny in spite of eating ravenously. Swelling hard and firm, and not very large. The *external* use of iodine should be avoided; under its employment the swelling may possibly disappear, but not without great danger of causing pulmonary complications.

Suppuration established, HEPAR SULPH., SILICA, and MERCURIUS are to be studied. Special indications for them may here be omitted. SILICA, more fully than HEPAR, covers the ill effects liable to arise from prolonged and extensive suppuration. Both remedies must be given perseveringly, and in doses not too crude, to yield their best effects. MERCURY is closely related to HEPAR SULPH.; a "greasy" condition of the skin has

proved a good indication. GRAPHITES, LYCOPODIUM, MERCURIUS and SULPHUR are useful when there are eczematous, or other, eruptions.

Surgical procedures are often imperative. The swelling should not be allowed to burst, but a clean, full incision with the knife should be made to evacuate the pus. Poulticing should be done sparingly, if at all. Under favorable conditions, i. e. when no attachments exist, the enlarged gland may be enucleated.

PULMONARY TUBERCULOSIS.

The bacilli invade the lungs by means of the circulation or of the air inhaled. If the former, the air-cells and the adjacent meshes of connective tissue become the primary seat of the infection. The extent of this infection depends upon the number of bacilli introduced; one lobe, or one lung, or even both lungs, may be involved. The process terminates in sclerosis of the tubercle and fibroid transformation, or in caseation and softening, which may involve extensive areas, or, if the parts are thickly studded with tubercles, in inflammatory involvement of the intervening tissues, constituting a true tubercular pneumonia. If the bacilli are introduced by means of the air inhaled, i. e. inhalation tuberculosis, the bronchi and bronchioles become the primary seat of the infection; the tuberculous masses themselves are larger, and the area involved much more extensive. A tubercular broncho-pneumonia results, which may become limited by sclerosis of the tubercles or end in caseation, ulceration, and the formation of cavities.

Various classifications of pulmonary tuberculosis have been made, that into 1) acute pneumonic phthisis, 2) chronic ulcerative phthisis, and 3) fibroid phthisis, being the most practical. It must, however, be remembered that the essential ætiological element is the same in all forms; the same general and anatomical features prevail in them all; the characteristic symptoms of the disease are the same in all; and the termination and treatment of the individual case, no matter to what form it belongs, depend upon considerations which apply rather to the tubercular process as a whole than to any special form of its expression.

Acute pneumonic phthisis—phthisis florida, galloping con-

sumption—occurs in both children and adults, and may be divided into the pneumonic and broncho-pneumonic form.

The *pneumonic form*, anatomically, presents the features of hepatisation of the lung, affecting usually one lobe or an entire lung. The lung is heavy, airless; the pleura is commonly covered with a thin exudation; the tissue is heavily charged with tubercles, and may present a grayish-white appearance; the affected areas may be circumscribed by injected, sometimes consolidated, lung tissue; cavities may form. In old cases caseous degeneration is abundant, and only narrow strips of elastic tissue may be met at the margins.

The symptoms in the early stage are those of lobar pneumonia, involving one lobe or an entire lung. The disease begins with a severe chill, followed by high fever; pain in the side; cough; frothy, then rust-colored expectoration; great, at times excessive, difficulty of breathing, with occasional suffocative attacks. The physical signs are those of tissue-consolidation, as dullness, increased fremitus, gradual disappearance of vesicular murmur, bronchial breathing. Instead of the usual crisis of pneumonia, between the eighth and tenth day, the symptoms continue without change, save as the general condition of the patient assumes a rather threatening aspect, indicated by increasing weakness, irregular fever, sweating, muco-purulent expectoration, and gradually developing evidence of softening, the expectoration now containing elastic tissue and tubercle bacilli.

Death may take place early, in the second or third week, during the stage of consolidation, or the patient may linger for several months, the involved lung-tissue passing through softening and cavity-formation.

The diagnosis is beset with difficulties. During the early stage no physical, or other, signs can be detected which distinguish this form of tuberculosis from non-tubercular lobar pneumonia. A suspicious family history or indisposition preceding the attack may place the watchful medical attendant upon his guard, but a positive diagnosis is out of question until the appearance of the bacilli in the sputa. The character of the fever may throw some light upon the case, since remission of from one to two degrees in the temperature may occur in tuberculous pneumonia, while the temperature of the non-tuberculous disease is more evenly sustained.

Acute tuberculous broncho-pneumonia is found among adults and children; in children it frequently follows infectious diseases, especially whooping-cough and measles. A pronounced tendency to early caseous degeneration is peculiar. The bronchioles are filled with a caseous mass, while the air-cells of the lobule are in a state of catarrhal pneumonia, the affected area presenting, first, a grayish-red, then a "cheesy," appearance. The areas of involvement differ in extent, and often are separated by fields of normal tissue; in other cases the entire lobe constitutes a mass of solid caseous substance. Again, areas of tuberculous affection are scattered throughout the lungs, preferably at the apices, the intervening tissue being comparatively healthy, but more commonly affording signs of recent pneumonia or splenization. The size of the tuberculous mass depends upon the size of the bronchus primarily infected; it presents the characteristic grayish-white, cheesy appearance, and may be as large as a cherry.

The symptoms are: Chill or chills, high fever, rapid pulse, increased respiratory movements, rapid loss of flesh and strength. Physical examination shows the presence of areas of defective resonance, especially at the apices, harsh tubular breathing, râles scattered throughout the lungs, and elastic tissue and tubercle bacilli in the sputa. Exceptionally hæmorrhage is an early symptom.

If the case is characterized by great intensity of action, a typhoid state may develop within three or four weeks, which usually terminates fatally within a short time. In other severe cases symptoms of tissue-softening, hectic and emaciation prevail for several weeks, and the patient appears in a most unpromising condition, when suddenly he begins to improve and makes a partial recovery, the disease assuming a chronic form.

In children the affection commonly sets in during convalescence from whooping-cough or measles, with fever, cough and dyspnoea, which grow somewhat less after a week or two. The child, however, remains weak, loses appetite, flesh and strength, and physical examination shows areas of impaired resonance and râles in different parts of the chest. Hectic fever and sweating gradually develop, followed by pronounced symptoms of pulmonary tuberculosis.

CHRONIC ULCERATIVE PHTHISIS.

The most frequent form of pulmonary tuberculosis, characterized by a tendency to softening and breaking down of tissue; in the course of the disease the affection changes from a purely tuberculous to a mixed infection.

Morbid Anatomy.—The primary lesion is usually from an inch to an inch and a-half below the upper border of the lung, near the posterior surface; hence the physical signs are easiest detected with the ear at the scapula. Anteriorly, a spot just below the centre of the clavicle, and less often a spot corresponding on the "chestwall with the first and second interspaces below the outer third of the clavicle" mark the seat of the primary lesion, the course of the disease extending downward, more often involving the right apex than the left. In some cases both apices are affected. Primary lesion may occur at the base, but not often.

Chronic ulcerative phthisis is a complex affection, and in its long course presents a great variety of lesions, of which some have already been incidentally discussed. *Miliary tubercles* are frequently found in large numbers, especially in the lower lobes when the apices are involved; they may occur in firm sclerotic bodies, evenly and thickly scattered throughout, a true chronic miliary tuberculosis, or in various stages of transformation; again, only a few may be detected by the microscope. *Broncho-pneumonia*, of tuberculous origin, results from primary tuberculous infection of the smaller tubes and subsequent involvement of their alveolar territory; rapidly progressing caseation or ulceration in the bronchial wall results in breaking down of tissue and in the formation of a small cavity. In the more chronic form the tendency is to sclerosis, by which a tuberculous mass may become incased in a fibrinous capsule, the inclosed firm, caseous mass often holding calcareous bodies—lung stones—which not infrequently are thrown off with the expectoration during later ulcerative processes. Colonies of miliary tubercles may be found outside of these capsulated masses. Their existence must necessarily be considered a sign of continued danger. The inflammation of the alveoli within the territory of the infected tube constitutes a *pneumonia* which in some cases presents all the characteristics

of red hepatization, in others appears evenly infiltrated throughout. Resulting consolidation of tissue at times embraces numerous foci of tuberculous infection, and thus may involve considerable areas of tissue. Sometimes the alveoli undergo fatty degeneration. *Cavities* or *vomicæ* are almost always the result of dilatation of the walls of an infected bronchus by the accumulation of retained secretion, followed by necrosis and ulceration of the wall, extending by contiguity of tissue. A number of such cavities may communicate with each other, all emptying into a bronchus. It is possible that necrosis and softening may take place in the centre of a cheesy mass without primary involvement of the bronchial wall. In the chronic form of phthisis these *vomicæ* have a limiting membrane whose inner surface produces pus. A slow but sure enlargement of the cavities takes place by necrosis and constant, tardy involvement of contiguous tissue. These cavities occupy the apex, vary in size, and may not only honeycomb the entire lung, but may in rare cases transform an entire lung into one large excavation. The contents of the cavity are usually purulent; remnants of tubes and blood-vessels are also seen. If the limiting membranes are very vascular, the expectoration shows free admixture of blood; if the wall has become gangrenous, there will be great fetor of the expectoration. In other cases the cavities have no limiting membrane—fresh ulcerative cavities,—but their walls consist of soft cheesy structure, which may rupture and cause pneumothorax. The cavities are very large in acute tuberculo-pneumonic phthisis, often occupying the greater portion of the upper lobe; they also occur constantly in chronic ulcerative phthisis in those portions of the lung which are newly involved. Nature attempts to render them harmless by surrounding them with a firm cicatricial tissue, and often succeeds in part; such cavities are said to be “quiescent.” Complete healing takes place only in very exceptional cases, and then only in cavities of small size. But even in large cavities a considerable protection against untoward effects, and a certain measure of limitation to rapid extension, is produced by an abundant development of connective tissue and resulting thickening. A peculiar feature in the formation of a cavity is the slow, gradual obliteration of the blood-vessels contained within it. Hæmorrhage from these is a common

complication, caused by the erosion of the wall of vessels not yet wholly obliterated or by the rupture of an aneurismal tumor formed by the weakening of the wall of the vessel itself and by the removal of supporting tissue. The *pleura* is almost always involved. Pleuritis occurs commonly and in repeated attacks, and may be simple or tuberculous. If the latter, miliary tubercles or caseous masses are found in the thickened membrane. Adhesions are frequent, and differ in firmness and extent. Pleural effusions and pneumothorax are common. *Catarrhal inflammation* of the *larger bronchi* is a common feature of the disease, and really is an extension upward of the process which has involved the smaller tubes. The mucous membrane lining the larger bronchi becomes swollen and sometimes ulcerated; the tube-walls are weakened, and bronchiectasis may result. The nature of the process as it affects the bronchioles has been described. The *bronchial glands* are usually enlarged and œdematous. They commonly contain tubercle and caseous foci, and may undergo all the changes incident to the tuberculous process. They constitute, as pointed out, a chief source of constitutional infection.

Of the involvement of more distant organs, *tuberculous laryngitis*, with ulceration of the vocal cords and destruction of the epiglottis, is one of the most important. Others are: tuberculosis of the brain, spleen, liver, kidneys, intestines, and pericardium; tuberculosis of lymphatic glands, as the retro-peritoneal and cervical; amyloid changes in liver, spleen, kidneys and intestinal mucous membrane; fatty infiltration and enlargement of the liver, and endocarditis.

Clinical Course.—In the vast majority of cases it is utterly impossible to clearly recognize the onset and the first symptoms of the disease. In almost every case a state of ill-health, with symptoms pointing now here, then elsewhere, has existed for a considerable period of time before some indication of pulmonary trouble calls attention to the possible existence of a tuberculous lesion, without even then, by physical signs or otherwise, affording ground for a positive diagnosis. In many of these cases symptoms of *dyspepsia*, with loss of flesh and energy, and often pronounced *anæmia*, are the first evidence of failing health; in others, *chills* and *fever* annoy the patient for a long time, and in a malarial district are easily attributed to malarial

poisoning; or the patient has long suffered from catarrhal trouble, has had a neglected cold, with, probably, symptoms of subacute bronchitis, cough, and tendency to asthma, all of which have been a source of trouble, but not sufficient to seriously alarm him or his physician; or an attack of *pleuritis* has left its victim with suspicious symptoms which eventually prove of tuberculous origin. In still other cases a *pulmonary hæmorrhage* has occurred, the patient possibly being in apparently rugged health at the time, and a period of perfect well-being may have elapsed since his lungs have begun to trouble him. Or such *laryngeal* symptoms as huskiness or partial loss of voice bring to the consultation room of the physician what proves a case of laryngeal phthisis, with rapidly developing pulmonary symptoms.

Local Symptoms.—*Pain* is usually of a pleuritic character; it is felt in the lower part of the chest, under the scapula or, more rarely, at the apex; it may be quite constant, or occur at long or short intervals, or may be wholly absent. *Cough* in the great majority of cases is a prominent symptom throughout the disease; occasionally some patient suffering from phthisis rarely coughs. At first it is a dry, slight, hacking, bronchial cough; later, after cavities have formed, it becomes paroxysmal, occurring more often in the morning or at any time after lying down and when waking from sleep. In advanced cases it grows more troublesome and continuous, often exhausting the strength of the patient, particularly when associated with much pain; frequently it provokes vomiting and upsets digestion; in many cases it sadly interferes with sleep at night.—*Sputum*. During the early stage the sputum is catarrhal, of glairy appearance, and resembles sago, from the presence of alveolar cells which have undergone myeline degeneration. Later, small, greenish-gray masses are expectorated, which it is well to examine microscopically. The expectoration becomes purulent and profuse as the lung-tissue softens, and eventually assumes the “nummular” form, isolated, grayish-green masses which at once sink to the bottom of a vessel containing water and constitute a proof of cavity formation. In exceptional cases no sputum is expectorated, even though there are physical signs of tissue-consolidation.

Microscopic examination of the sputum will determine the

presence of the bacillus of tuberculosis, and thus firmly establish the specific nature of the disease. Ehrlich's method, described on a preceding page, is very satisfactory. Dr. Heneage Gibbes recommends the following as well adapted to rapid work for diagnostic purposes: take of rosanilin hydrochloride two grammes, methyl blue one gramme; rub them up in a glass mortar, then dissolve anilin oil 3 c.c. in rectified spirit 15 c.c.; add the spirit slowly to the stains until all is dissolved, then slowly add distilled water 15 c.c.; keep in a stoppered bottle. To use the stain: The sputum having dried on the cover glass in the usual manner, a few drops of the stain are poured into a test tube and warmed; as soon as steam rises, pour into a watch-glass, and place the cover-glass on the stain. Allow it to remain for four or five minutes, then wash in methylated spirit until no more color comes away; drain thoroughly and dry, either in the air or over a spirit lamp. Mount in Canada balsam. The whole process, after the sputum is dried, need not take more than six or seven minutes. This process is also valuable for sections of tissue containing bacilli, as they can be doubly stained without the least trouble. Regardless of the method employed, repeated examinations are often necessary to prove the presence of bacilli.

Elastic tissue is derived from the bronchial, alveolar, or from the arterial coats; if bronchial or alveolar, it indicates extensive erosion of the tube and softening of the pulmonary tissue. It is usually examined by boiling a quantity of the sputum in caustic soda solution for fifteen or twenty minutes or until liquefaction has taken place. As the solution is allowed to settle in a conical glass, the elastic fibre will fall to the bottom and, upon removal with pipette, is easily recognized under low power. Osler recommends as equally satisfactory the method of Sir Andrew Clark, which depends upon "the fact that in almost all instances, if the sputum is spread in a sufficiently thin layer, the fragments of elastic tissue can be seen with the naked eye. The thick purulent portions are placed upon a glass plate fifteen by twenty centimetres and flattened into a thin layer by a second glass plate ten by ten centimetres. In this compressed grayish layer between the glass plates any fragments of elastic tissue show on a black background as grayish-yellow spots and can either be examined at once or under a low

power, or the uppermost plate of glass is slid along until the fragment is exposed, when it is picked out and placed upon the ordinary microscopic slide." The elastic tissue from the bronchial tubes is seen in long narrow fibres, close together, or in an elongated network; the tissue from the blood vessels often preserves its easily recognized form; otherwise it appears not unlike the bronchial elastic tissue; that of the alveolar walls is branched and often preserves the original form of the cells. Blood and various fungi may also be shown under the microscope.

Hæmoptysis may occur long before the existence of a serious pulmonary lesion is suspected, and is a common feature of well-pronounced cases. The doctrine formerly held that pulmonary tuberculosis is often a sequel of hæmorrhage has been discarded, and it is now generally held that the bleeding from the lung is in itself presumptive evidence of serious pulmonary disease. If the blood is found mixed with the mucoid expectoration, its source is a congested bronchial mucous membrane or actively congested lung-tissue; if it is clear and occurs in considerable amounts, it is due to the erosion of a blood vessel or to rupture of an aneurism in a cavity, the amount of the hæmorrhage indicating the size of the eroded vessel. *Dyspnœa*, if well pronounced, is the result of active and rapidly advancing bronchopneumonia or of the invasion of a large area of lung tissue by miliary tubercles. But very extensive involvement may exist without much difficulty of breathing or great frequency of the respiratory movements. "One reason why there is so little shortness of breath in phthisis is that there is always a moderate grade of anæmia, and the diminished lung space is sufficient to supply oxygen to the reduced number of blood corpuscles."

General Symptoms.—*Fever* is usually present throughout the course of the disease, though even here exceptions to the general rule are by no means infrequent. The fever is fitful, and nothing short of the constant and frequent use of the clinical thermometer can accurately keep track of it. It is of various types, intermittent, remittent, sometimes continuous; if the latter, remissions are common. The intermittent character of the fever is sufficiently pronounced to lead, often, in malarial districts, to the mistaken diagnosis of malarial fever. The fact that all stages of tubercular disease may, and do, simultaneously exist in the affected lung explains the occurrence of differ-

ent types of fever at the same time. During the onset the fever is fairly continuous, but slight remissions are sure to be present. Later the remissions are less marked, particularly so when the disease is making rapid progress. When suppurative processes and systemic infection become a prominent feature of the case, pronounced intermissions and a subnormal temperature for a part of the time are present (hectic fever). Acute pneumonic processes, such as often occur in the course of phthisis, cause a persistent elevation of temperature, with only slight remissions, not more than one degree. The maximum temperature is commonly reached in the afternoon, from 2 to 6 P. M.; the minimum temperature in the morning, between 2 and 6 A. M. *Night-sweats* are frequent, and are dreaded by both patient and physician. They occur at night or while the patient is asleep, are drenching, and not only give rise to discomfort, but often to severe chilling. The *pulse* is frequent, soft, and lacking in volume; its rapidity depends in a measure upon the degree of pyrexia present. *Emaciation* is marked and progressive. A gain in flesh and weight in a phthisical patient is an encouraging sign. The *nervous system* may be seriously affected. Tuberculous lesions occasionally involve the brain, giving rise to a variety of disturbances the exact nature of which depends upon the part of the brain involved; cerebro-spinal meningitis occurs rarely. The mind of the consumptive is usually clear to the last; hopefulness is almost characteristic of the disease. Insanity may develop in chronic cases, usually in those well advanced. Among the *gastro-intestinal* symptoms the most noteworthy, and from a clinical aspect the most troublesome, is *diarrhœa*, depending upon a catarrhal condition of the intestinal mucous membrane, or the result of amyloid degeneration, or of tubercular ulceration. *Gastric* disturbance is chiefly expressed by loss of appetite, fitfulness in eating, often nausea and very persistent vomiting. The latter, when present, constitutes a distressing feature of the disease; it may be due to central causes, to pressure on the vagi, to stimulation from the peripheral branches of the vagus, or to mechanical causes. Tubercular infection may occur at almost any point, and cause much trouble; witness the sore throat and difficulty of swallowing caused by tuberculosis of the larynx.—The *circulatory system*. Involvement of the left upper lobe of the lung leads to

exposure of a considerable surface of the heart, and if there is much retraction of the lobe, the heart may be drawn upward. There may then be pulsations in the second, third and fourth interspaces, near the sternum. Apex murmurs are often present; they may be harsh and rough, even when there is no endocarditis. Systolic murmurs are common in all stages. The heart itself is often involved. Osler records twelve instances of endocarditis in 216 autopsies. Capillary pulse is at times noted, and pulsation of the veins in the back of the hand may be observed. Chloro-anæmia is common.—The *genito-urinary* symptoms. Albumin in the urine may be due to fever or to organic changes in the kidneys, as amyloid disease. Sometimes a condition closely resembling chronic Bright's disease is present. Pus, bacilli or blood are occasionally found in the urine, especially when there is ulceration.—The *skin* tends to become dry and harsh, and local tubercles are sometimes seen on the hands. Pityriasis versicolor is not infrequently observed on the chest and back, as well as chloasma phthisicorum, pigmentary staining. *Clubbed fingers and toes*, with "claw-like, in-curving nails" and *œdema* of the feet and legs, due to femoral thrombosis or weakness of the heart, are common in the later stages.

Laryngeal tuberculosis and *pneumothorax* are also to be mentioned; the former is of comparatively frequent occurrence after the lung has become extensively involved, and may usually be considered a very unfavorable symptom at any stage of the disease; the latter is caused by the bursting of a cavity into the pleural sac. In women *menstruation* is frequently suspended, quite early in the case of young women; more often the suppression of the menses is due to the physical exhaustion which is a feature of the advanced disease. Enlargement of the mammary gland, especially in males, has also been noticed; according to Allot, it is a chronic interstitial, non-tuberculous mammitis.

Physical Signs.—A satisfactory examination of the chest does not only include a knowledge of the physical signs to be looked for, and their ready recognition, but a carefully trained judgment which is the result of large clinical experience. The young physician, unless he has had unusual opportunities, should often and carefully examine the chests of presumably

healthy persons, for the sake of noting the sounds obtained by percussion and auscultation and of so training the ear that it will recognize them and differentiate between them. Thus normal and abnormal sounds will eventually be distinguished with readiness and interpreted correctly.

Inspection.—The unreliability of the shape of the chest as an indication of existing phthisis, in the early stage, is now generally understood. However, any considerable flattening in the upper thorax, especially in the supra- and infra-clavicular region, should be noted, and the chest-expansion carefully observed. Flattening on one side, above or below the clavicle, is a suspicious symptom. *Palpation*, in the *early stage*, will confirm the existence of deficient chest-expansion. There is increase in the vocal fremitus, of importance when on the left side. *Percussion*: The value of this method depends largely upon an exact comparison of the sounds obtained on both sides, remembering that on the right side the pulmonary resonance is less marked than on the left, and that the "pitch" of the percussion sound on the right side is higher. The extent and depth of the consolidation naturally affects the percussion sounds. If slight and superficial, the percussion sound will be raised; if deep and protected by healthy or emphysematous tissue, lying between the chest wall and the consolidated tissue, the percussion sound may be normal or very resonant. Flint states that in doubtful cases the percussion should be performed at the end of a full inspiration and of a full expiration. Increasing consolidation causes increasing rise of the pitch of the sound and diminishing clearness, until, in some cases, absolute dullness is reached. *Auscultation*: The respiratory sound in the affected region varies. It may be weak or suppressed at one point, exaggerated at another, often jerky, "cogged-wheel," or coarse and bronchial. The inspiratory sound is high-pitched and tubular; the expiratory sound still higher in pitch and "lingering." "The value of these states of the respiration corresponds to their position. If they exist above and are imperceptible below the second interspace, they are seriously significant. Localized mucous or sub-crepitant râles, heard over a limited space at the apex of the lung, are always important signs of tuberculosis and indicate the development of broncho- or catarrhal pneumonia. They are often present before any

appreciable change in the respiratory murmur occurs. At first they are more or less obscure in proportion to the weakening of the respiration; gradually they become more distinct and numerous as the pulmonary consolidation increases. The heart sounds over the affected lung will be increased in intensity." (Flint: Physical Diagnosis.)—There may also be exaggerated vocal resonance at the left apex.

The advanced stage presents much more distinctive signs. *Inspection* now shows general contraction of the chest walls, corresponding to the destruction of lung tissue and resulting shrinkage in the volume of the lung. The infra- and supra-clavicular depressions are marked, expansion is notably diminished, possibly arrested near the apex, and there is increase in the frequency of respiratory movements. *Palpation* yields, usually, increase of vocal fremitus over the area of consolidation, sometimes gurgling fremitus. *Percussion*: Extensive and marked dullness prior to the formation of vomicae. The cavity having formed, and being of small size, and lying within an area of consolidated tissue, the percussion sound is dull or tubular; if the cavity is full and protected by a layer of healthy tissue, percussion must be forcible to yield the characteristic dullness. If the cavity is large, empty, superficial, and thin-walled, the "cracked-pot" sound is heard. *Auscultation*: Consolidated tissue yields bronchial, moist, crackling, metallic râles, sometimes "lingering" or "sticky," not affected by coughing. Intense bronchial breathing and intensely metallic moist sounds are usually heard at the seat of the cavity. *Cavernous* sounds are heard in an empty, superficial cavity in communication with a bronchial tube, the cavity walls collapsing and expanding with each inspiration. *Amphoric* sounds, resembling the sound "heard on blowing into a decanter," are produced if the cavity is large and surrounded by any firm structure which prevents collapse during inspiration. *Gurgling* sounds are caused by the accumulation of fluid in a cavity, sufficient to rise above the opening into it. Small cavities, partly filled and deep-seated, yield gurgling sounds which it is difficult to distinguish from mucus râles. Vocal resonance rarely is of positive value. It may be absent or weak, amphoric or bronchophoric; or there may be pectoriloquism.

It must not be forgotten that, especially in the early stage,

many of the signs are best heard behind and that, owing to the complexity of the lesions which may exist in the same lung, a puzzling variety of the signs described may be detected.

FIBROID PHTHISIS.

Fibroid phthisis is a sclerosis of the lung tissue, with gradual shrinkage, resulting from chronic tuberculous broncho-pneumonia or chronic tuberculous pleurisy, sometimes also occurring as a feature of ulcerative phthisis. The process is identical with chronic interstitial pneumonia or cirrhosis of the lung. It usually affects the apex of one lung. A dense fibrous formation surrounds a cavity; the pleura becomes thickened, gradually the affection invades the lower lung, with shrinkage and retraction of the diseased lung and displacement of the heart, and occasionally of the liver, toward the affected side.

The disease is characterized by paroxysmal cough, worse in the morning, purulent expectoration, very offensive when bronchiectasis is pronounced, some dyspnoea, and slight, if any, fever. There is dilatation of the bronchi and hypertrophy of the right ventricle or of the entire heart. Bacilli or evidence of tuberculous infection are usually found in advanced cases. Hæmorrhage may occur from an aneurismal sac in a cavity. The physical signs observed are a sinking of the chest wall on the affected side, with dropping of the corresponding shoulder, and symptoms which are due to the displacement of the heart, as heart murmurs and cardiac pulsations in the third, fourth, and fifth interspaces, if the left lung is involved. The various sounds due to the formation of cavities, the degenerative changes in other organs which follow chronic suppuration, and dropsical conditions, depending upon heart-failure, are added to the signs which are incidental to the process.

Fibroid phthisis is essentially a chronic disease, and may continue from three or four to twenty, or more, years.

Diagnosis of Pulmonary Tuberculosis.—It is obvious that much depends upon a prompt recognition of this disease in its early stage. No effort should be spared to determine the nature of the complaint and, this accomplished, to impress upon the mind of the patient the gravity of the situation. It is well known that consumptives are, as a rule, unwilling to believe

that they are in danger, and insistence on part of the physician may expose him to unmerited suspicion; but it is by far best to ignore the latter and to be unconditionally frank, thus placing the full measure of responsibility upon the patient and his family.

The value of the microscope as a means of diagnosis has been emphasized, and the mode of procedure in examining for the bacillus tuberculosis has been described. It must be remembered that in about thirty per cent. of cases repeated examinations are required to establish the presence of the bacillus, and that even failure does not necessarily disprove a diagnosis of tuberculous phthisis. Inoculation for diagnostic purposes has of late received much attention.

Among the many symptoms of phthisis few are of more positive diagnostic value than the fact that the earliest signs are almost invariably observed at the apices.

Chronic Bronchitis resembles the early stage of pulmonary tuberculosis before tissue-consolidation has taken place. Bronchitis, however, is a bilateral disease, lacks the profound constitutional symptoms of tuberculosis and, usually, presents well-defined and characteristic physical signs. In the absence of bacilli, under microscopic examination, the diagnosis must be guarded until light is thrown upon the case by the development of later and positive symptoms.—*Chronic Pleurisy*, with effusion, in many respects bears a much closer resemblance to phthisis, including cough, dyspnoea, emaciation and, if pus be present, even hectic fever. In pleurisy, however, the area of dullness extends from below upward, and there is an absence of the respiratory sounds which are characteristic of phthisis. "The other signs over the lower part of the chest also, the absence or diminution of respiratory sounds, of vocal resonance and fremitus, etc., unite in proclaiming the collection of fluid. When this collection is sufficient to solidify, it may be in some cases for a time difficult to decide whether we have a case of pleuritic effusion alone or of one complicated with phthisis, the sign of solidification at the apex, either from compression or from tubercular deposits, being pretty much the same. If, however, as is often the case with the latter trouble, râles are also present at the apex, if the emaciation and the hectic are particularly well marked, aspiration showing no pus in the pleural

cavity and the temperature ranging from 100° to 103°, and if hæmoptysis has occurred, we have very strong reasons for suspecting the complication. This will be reduced to a certainty if after a while a tubercular deposit is found, by its physical signs, to have taken place at the other apex. If, after the radical operation for empyema, with daily washing out of the pleural cavity, the temperature does not fall to nearly the normal, phthisis in connection may be suspected. If the pleuritic trouble affects both sides of the chest, a phthisical complication is exceedingly probable." (H. C. Clapp.)—*Acute croupous pneumonia* affects by preference the lower lobe or the whole lung, but it may involve the apex; if so, the diagnosis presents difficulties and rests largely upon the history of the case. *Pulmonary cancer* is usually a secondary affection, and the existence of cancer in any other part of the body is strongly presumptive evidence of the cancerous nature of an incidental pulmonary lesion. If primary, one side, usually, is invaded; but the absence of special preference for the apex, the comparative slowness with which the cancerous tissue breaks down, the jelly-like expectoration, the less rapid emaciation, the continuously severe pain, as compared with the absence of pain or the pleuritic pain of tuberculosis, will establish the nature of the disease. *Pulmonary abscess* after pneumonia usually affects the lower lobe of one lung, and has a characteristic penetrating, unmistakable fetor of expectoration. *Pulmonary gangrene* involves the lower lobe of one lung, the expectoration is horribly fetid, the breath almost equally so, the sputum is of a dark, brownish color, and broken-down tissue occurs in abundance. *Pulmonary syphilis* is rare, generally affects the base or the lower part of the upper lobe, progresses rather slowly, and has a history of syphilitic infection. *Bronchiectasis* cannot always be recognized. It has the physical signs of a cavity, but the area of dullness is more limited. The expectoration is more copious and fetid, and occurs in connection with paroxysms of coughing which are usually brought on by a change of position and take place at long intervals, with prolonged periods of freedom from cough between them. Marked embarrassment of the pulmonary circulation is frequently present.

Prognosis.—The prognosis, as to complete recovery, is unfavorable. That the disease is often indefinitely arrested, even in

unpromising cases, the patient eventually dying from some other cause, is shown in the experience of every practitioner and by an abundance of evidence obtained *post mortem*. Removal to some suitable climate is not infrequently followed by great improvement and by an arrest of the disease; such improvement may often be maintained for years, and life and usefulness correspondingly prolonged, by making the change of climate permanent.

A continuous lowering of the temperature, lessening of nervous tension, and gain in weight may be considered favorable symptoms; the reverse, of course, obtains. Gastro-intestinal and laryngeal complications are always unfavorable. Fistula in ano and hæmorrhoids very often complicate tuberculosis, and it is undoubtedly true that in either case an operation, though in some respects affording the patient relief, is followed almost invariably by an aggravation of the general condition and materially hastens the fatal termination.

Death occurs from asthenia, and may be peaceful to the last degree, consciousness being retained to the very last; or from *syncope*, as after severe hæmorrhage or in connection with organic cardiac disease; or from *asphyxia*, especially in acute miliary tuberculosis, rarely in the chronic form; or from *hæmorrhage* due to erosion of the coats of a large blood-vessel or the bursting of an aneurism; or from *cerebral* causes, as coma due to meningitis.

TREATMENT OF PULMONARY TUBERCULOSIS.

Prophylaxis: Marriages should not be contracted between parties of phthisical predisposition, and this prohibition should be enforced more rigorously in the case of a woman than of a man, for statistics plainly prove that consumption is inherited through the mother oftener than through the father. While under appropriate treatment a girl's health may improve, pregnancy and child-birth, with the subsequent task of suckling and caring for the child, will so lower her vitality that she can neither maintain her own health nor supply proper nourishment or care to the infant.

The child born, every means must be employed to prevent exposure to infection and to cultivate to the utmost everything

that promises to give it a rugged constitution—for that means power to resist disease. The former consists of careful protection against close contact with the products of the disease, and chiefly implies the common precautions on part of consumptives not to expectorate carelessly, to promptly destroy the sputum, and not to infect others by kissing them.

The danger of inhaling pulverized dust containing the bacilli of tuberculosis has been discussed, and is quite fully realized by the profession and by the intelligent laity. It is, therefore, only just to insist that consumptives shall take pains not to become a source of danger to others. If cuspidors are used, they should contain a 5 per cent. solution of carbolic acid in water, and should be frequently emptied and thoroughly cleansed and disinfected. Paper cups, supported by a metal rim, are now generally sold, and are both convenient and inexpensive. If the patient is too ill to raise his head from the pillow, paper handkerchiefs may be used and then burnt at once; cloths and towels, used for the same purpose, must be immediately destroyed.

The habit of expectorating upon the sidewalk, streets, or into the gutter, is both disgusting and dangerous. Detweiler's flask makes this practice unnecessary. "It is made of blue glass, is flat, and holds about three fluid ounces. There are two openings, one at the top and one at the bottom, both having metallic screw-caps. The upper opening, which is the larger, has in addition a spring cover or lid which closes tightly; also a polished metal funnel which reaches half way down into the flask." This funnel prevents the spilling of the contents even if the flask is left open; the lower opening aids in giving it a thorough cleansing. Its use should be made obligatory.

If the mother is consumptive, the infant should be nursed by a healthy foster mother, or, if that is not possible, should be "brought up by hand" on the milk of a carefully selected cow or goat. The animal thus selected should have the greatest freedom possible, and its feed and stabling should be made the object of close care. Sterilization and boiling of the milk has its warm advocates, but there are objections to both; it is advisable in the city. If the child prospers, weaning should be postponed as long as possible.

Inunctions of olive oil, cocoa-nut oil, or cod-liver oil, warmed

and persistently applied over the abdomen, may be used if the child does not thrive under the treatment outlined, and artificial foods, malted milk, and other standard preparations, may be tried; the bowels in the meantime must be kept open by the indicated remedy or by the judicious use of the enema.

The cool bath, once or twice a day, followed by friction and massage, is helpful. "Taking cold" must be painstakingly avoided, and to that end the child must be clothed properly, not too warmly. Light woolen undergarments are particularly suitable. Jæger's underwear and the "Jaros Sanitary Wear" are the best that can be obtained. With it all, the child must not be "babied" too much. The throat and chest should often be sponged in cool water and the little one made to live out in the open air when the weather permits, even if the day is cool. While in the house, the nursery should not be overheated; a temperature above 70° F. is objectionable; if the heat in the room is dry, moisture must be provided by placing upon the stove or radiator a small vessel containing water. Draughts and sudden changes of temperature are dangerous.

With advancing years, many difficulties are removed, while others increase. The diet should be wholesome, not too stimulating; if digestion is not good, it must be improved by judicious management and the use of proper remedies rather than depend upon peptonized and specially prepared foods. Proper clothing; a sufficiency of sleep; a life in the open air, with an abundance of sunshine; moderate hours in the school room; healthful moral tone; in due time proper instruction in sexual hygiene and judicious preparation for a normal adolescence,—all these are of far-reaching importance, and worth the personal attention of parents and physicians.

Unfortunately, many conditions which are absolutely necessary for the modification or eradication of the susceptibility to phthisis can only be met if the parents are in comfortable circumstances. Thus, among the very poor it is almost useless to talk of "sanitary conditions" save as enlightened public policy finds a way of providing them. But large, well-ventilated rooms, dry and airy, with an abundance of breathing space; pure wholesome water; wholesome food; and, above all, residence in a climate both bracing and free from extremes of temperature, are wonderful agencies in toning up a naturally

feeble constitution and in eradicating an inherited predisposition to tuberculous affections.

Should symptoms of pulmonary involvement actually show themselves, the most pressing consideration is that of *climate*.

Climatology is so extensive a subject, and our knowledge of it is as yet so limited and unsatisfactory, that it will be discussed very briefly. This may prove the more practical since no one spot on earth, no matter how favored it may be, combines all the conditions which constitute an ideal climate or meets the requirements of more than a small number of cases. Additionally, I am influenced by the belief that little benefit is derived from a change of climate unless the change is protracted or permanent and does not include, as it most always does, a surrender of home and home comforts, and a separation from all that makes life precious, including every familiar voice and every loved face.

The chief conditions to be met are: equability, comparative dryness of the air, abundance of sunshine, dryness and good drainage of the soil, pure water, absence of violent atmospheric disturbances, and proper altitude. To these may be added certain minor considerations, such as beauty of scenery, cheapness of living, nearness to some large town which provides means of amusement, opportunities to bathe, fish, swim, drive, ride, hunt,—conditions which add to the pleasure of living and constantly hold out inducements to pass the time in the open air.

It is safe to affirm that many points in America, and these alone will be considered, possess to a large degree many or all these features. Yet, each point has its special advantages and disadvantages, and to select for any individual case the climate best suited to the stage of the disease and to the particular need of the patient is a task of some magnitude, often only settled by actual and persevering trial. It is remarkable with what readiness medical men undertake to pose as authorities on the subject of climate from observations gathered on a flying trip through the country, often passing a very few days in a locality upon whose climatic features they write extensive articles, when physicians on the ground are forced to confess that each day's additional observation increases their caution in making claims to special knowledge save as it is expressed in very general propositions. In fact, a climate selected for the

very best reasons as peculiarly suitable for a certain patient often proves the reverse; and it is no infrequent occurrence to have a patient do well at a point which at first glance seems little adapted to his needs. It is partly on this account that no invalid should be allowed to assume the responsibility of deciding for himself, but should be referred to a local practitioner of intelligence and candor whose decision must be final.

C. J. B. Williams and C. Theodore Williams, excellent authorities on the relation of climate to the cure of consumption, lay down the following general rules: High-altitude stations are most beneficial for cases of (1) marked hereditary predisposition in which phthisis is either threatened or in a state of early development; (2) imperfect thoracic or pulmonary development; (3) hæmorrhagic phthisis; (4) chronic pneumonia, without bronchiectasis, which does not resolve; (5) chronic pleurisy, where the lung does not expand after removal or absorption of the fluid; (6) phthisis accompanied by more or less pneumonic consolidation; (7) chronic tubercular phthisis in its various stages, provided the lung surface be not too strongly involved to admit of proper respiratory change at the high altitude, and there be no pyrexia.

Mountain climates are counter-indicated in cases of (1) emphysema and phthisis with emphysema; (2) chronic bronchitis and bronchiectasis; (3) diseases of the heart and great vessels; (4) affections of the brain and spinal cord and states of hypersensibility of the nervous system; (5) diseases of the kidney and liver; (6) diabetes; (7) catarrhal phthisis; (8) phthisis with double cavities, with or without pyrexia; (9) all cases of phthisis in which the pulmonary area is too largely encroached upon to admit of the proper performance of the respiratory function; (10) cavity cases with profuse hæmoptysis, pointing to the probable existence of a pulmonary aneurism; (11) cases of phthisis with great irritability of the nervous system; and (12) patients advanced in years or too feeble to take exercise.

The cases best suited for sea-voyages are: (1) hæmorrhagic phthisis; (2) scrofulous phthisis, especially where fistula has developed; (3) cases of limited consolidation or cavity, where without pyrexia the cough is hard and obstinate, probably from bronchial involvement; (4) cases of phthisis with emphysema; and (5) cases of limited tuberculous disease in patients who have been overworked in mind and body.

Climatic changes are without influence in cases of acute tuberculosis, tuberculo-pneumonic phthisis, laryngeal phthisis, acute phthisis, except in a few instances where the intensity of the tuberculous process has been reduced by extensive exudation and has passed into quiescence; also cases accompanied with continuous pyrexia, or in which the process of tuberculization or excavation is actively proceeding, and advanced phthisis accompanied by intestinal ulceration and diarrhœa.

H. C. Clapp points out that "it is particularly important to remember that change of climate is a relative term, and that to receive benefit from it there is by no means always the necessity for travelling to the ends of the earth or to a great distance. Often only a few miles, or possibly a few rods, from a valley to a hill-side, from a swampy neighborhood to a dry, gravelly soil, may be sufficient. This fact is too often forgotten, but has been repeatedly proved."

The *South* presents many attractions to those inclined to consumption; these depend largely upon the accessibility of the country and its warm, genial winters. Cases of severe bronchial affection and imperfectly resolved cases of pneumonia do nicely there. The local conditions, however, are not always favorable in well-established phthisis, the patients often suffering from debility, the result of the heat and moisture frequently found there, and the malarial influences which are at work under these conditions. This applies particularly to *Florida*. Its nearness, however, to the northern states, the ease with which its resorts are reached, and the many attractions offered by them, makes *Florida* and some portions of *Texas*, as *San Antonio*, of the greatest value to those who require little more than an escape from the severity of a northern winter and spring. *Aiken*, *South Carolina*, is located on a high, sandy ridge, has an even, warm temperature, and is surrounded by groves of pine which render the air very grateful to persons with weak lungs. Of late years excellent hotels have been built for the convenience of invalids, and, with the exception of occasional severe north-easters, the locality possesses many features which commend it highly. *Georgia* has a comparatively dry atmosphere and varying altitude, and to the patient who is able to endure "roughing it," offers an agreeable and healthful change; the *Cumberland Table Lands*, in *Eastern*

Tennessee, has similar advantages, and for its natives there is claimed an almost complete exemption from consumption. *Minnesota* has an even, dry, cold climate, with moderate rainfall and elevation, and an abundance of spruce and pine; its summers are hot and sudden changes of temperature are common. The *Adirondacks*, in New York, and the *White Mountains*, in New Hampshire, offer similar advantages. Undoubtedly, an open-air life in these regions has decidedly beneficial effects, and a long season spent in them will prove helpful to those who, chief of all, must get away from the confinement and excitement of business life, and who, if inclined to phthisis, have as yet no extensive involvement of lung tissue and possess sufficient vitality to endure a considerable amount of exposure and cold. All others run great risk from entering upon this sort of life. Residence in the *Rocky Mountain* region, more especially *Colorado*, has unquestionably prolonged the life of many consumptives. The greater portion of Colorado has an altitude ranging from 1500 to 11,000 feet, and more, above the level of the sea, an abundance of sunshine, and marked mildness and dryness of the atmosphere. Denver, Colorado Springs, Manitou, and other points, are favorite and charming resorts. Objections are the great difference between day and night temperature, frequent severe winds and clouds of dust (a recent writer points out the fact that high winds, and that means dust, are peculiar to all health resorts of established reputation), and the high elevation of many of its most attractive and famous resorts. *Wyoming*, *New Mexico*, and *Arizona* have each their admirers, and deservedly so. All have dry, pure air, varying altitude, and during a portion of the year offer every inducement for an open-air life. Lack of facilities for the comfort of invalids and frequent severe storms in the winter are objections to Wyoming as a permanent home for consumptives. These objections apply less forcibly to *New Mexico*. Las Vegas, Hot Springs, N. M., is a charming place, well sheltered, at an elevation of 6,700 feet above sea level, has a fine reputation as a summer resort, but is objectionable as a winter home. El Paso, is less than 4,000 feet above the sea level, has sandy, porous soil, and as a winter residence has proved of great benefit to persons suffering from asthma, bronchitis, and consumption. Throughout the state the atmosphere is dry, and

the sky almost cloudless; the heat at midday is very great, and the changes in temperature between night and day, monthly and yearly, are unpleasantly pronounced. It is stated upon good authority that the Indians of New Mexico suffer very little, if any, from consumption, and U. S. troops, stationed there during a period of ten years, from 1867 to 1876, had only two deaths from consumption among eighty-two men. *Arizona* possesses exceptional dryness and purity of the atmosphere, almost perpetual clearness of the sky, and very few rainy days; the country is mountainous and wild. Certain points, as old Fort Apache, are especially salubrious. The elevation ranges from 500 to 6,000 feet above sea-level. Patients who require dryness and warmth of the atmosphere, and who are strong enough to endure a rough life, will do nicely here. Some recoveries from phthisis have been made in the late stage of the disease, and Arizona will beyond a doubt become a favorite resort for consumptives as soon as better provisions can be had for the comfort of invalids. *Southern California* is remarkable for the great variety of its climate within comparatively narrow geographical limits. The coast belt affords all the advantages of nearness to the sea without that rawness of the atmosphere which characterizes the Atlantic coast for a considerable portion of the year, and, to a remarkable extent, freedom from severe storms. Retiring inland, and beyond the immediate sweep of the continuously moving, gentle sea breeze, the heat increases and soon reaches the high average which belongs to the semi-tropics. The average temperature, at noonday, twelve miles inland, is probably twenty degrees higher than on the coast. The altitude also increases gradually, for the coast range of mountains follows the general outlines of the coast, sometimes closely approaching the sea, sometimes receding to a distance of fifty, or more, miles. Here delightful summers and cold winters, with quite pronounced changes of season, prevail, wholly at variance with the continuously even temperature near the coast, especially in the extreme south of the state. Still further eastward lies the desert, at an elevation of some 2,000 feet, hot and dry, with a day temperature of 100° to 110°, followed by nights so cool that heavy blankets are necessary for comfort. The main chain of the Sierra also runs parallel to the coast, at a distance of 60 to 200 miles, rising to

an elevation of from 8,000 to 14,000 feet, with spurs which often touch the lower coast range, and form valleys and sheltered nooks which by their varying altitude and exposure to air currents from the sea or to the warm desert winds fairly revel in differences of climate and of vegetation. "While upon the ocean side of the range are great forests where the giant redwood is bathed nightly in the dense, cool fog which seems to be essential to its growth, just across the summit are warm mountain slopes facing off toward the morning sun, their rolling hills green to the very crest with the olive and the vine; and yet, from their sheltered warmth one may pass on for a few miles to some pass or gap in the range that is swept during all the summer months by the great, cool ocean wind as it rushes through to the heated interior. Thus, there is scarcely a point in California where one within a few hours by rail has not his choice of a climate varying from the heat of the Atlantic or Mississippi midsummer to the coolness of the White Mountains or the perpetual snows of the higher Alps; his choice from a hot, dry air, as of the highlands of Arabia, to fogs and coolness, as of the west coast of Scotland; his choice from a stillness, as of a calm of the 'hollow lotus land,' where no harsh winds blow, to other points swept by ocean winds which for months pour inland with the rush and the roar of a great aërial river. It is this infinite variety, lying back of the typical equability, which gives to the Pacific slope climate its strongest charm, and which makes it suit so infinite a variety of constitutions and diseases." (Drs. Lindley and Widney.)

The rainfall in Southern California occurs in the winter months. It is no continuous rainy season, but three or four storms, preceded by some days of cloudy weather, and followed by beautifully sunny, clear days, furnish the necessary rain to bring out and maintain the luxuriant verdure of this southland. Fogs are not the chilling fogs of the Atlantic coast, but occur in the early morning hours, usually disappear shortly after sunrise, and only rarely annoy those who are especially sensitive to them. The range of humidity is very great. The average at Yuma is 43; at San Diego, about 70; at Los Angeles, about 68; at New Orleans, about 79. In the interior valleys it is probably not far from 60. The average number of cloudy days in the year is about 40 in the interior, somewhat greater

nearer the coast. Violent windstorms are practically unknown, but a continuous breeze from the ocean cools the heated atmosphere. It is largely due to this soft, cooling breeze that in the strip of country lying about the Bay of San Diego, in the extreme southwest of the United States, great heat in the summer months is unknown, the majority of residents wearing the same weight and thickness of undergarments throughout the year. The temperature is remarkably even. The home of the orange and lemon must be without frost in the *winter*; and earth offers no more charming country for a *summer* residence, away from oppressive heat and violent storms, than the coast of southern California. The annual mean temperature of New York is 53.3° ; that of Los Angeles, 60.5° ; San Diego, 60.5° . The average in January is in New York, 30.0° ; at Los Angeles, 52° ; at San Diego, slightly higher, 52.8° ; in July, in New York, 72.6° ; at Los Angeles, 68.2° ; at San Diego, slightly lower, 66.9° . The daily range in January is in Los Angeles, 21.5° ; at San Diego, 19.0° ; in July, at Los Angeles, 28.3° ; at San Diego, 14.6° .

But Southern California is not a paradise, and does not by any means restore health and life to every pilgrim in search of them. Here, as elsewhere, there are damp, cold, unhealthful localities, unfit for permanent residence and otherwise open to serious objections. Summing up the benefits derived from a residence in the state, it may be said that they depend upon the opportunity offered of living the entire year in the open air, in a sea of sunshine, in almost any altitude desired, with almost any degree of humidity needed, and beyond the danger arising from sudden, unexpected changes or extremes of temperature.

Certain considerations should always be kept in mind when sending a consumptive away from home. The trip should not be postponed until the disease is too far advanced. It is useless to expect much benefit in a case where there is extensive breaking down of tissue; death is the almost inevitable outcome, and death in a strange land, among strangers, is a hard fate from which the home physician should save the sufferer. Again, a consumptive should not go away from home unless he has the means to take advantage of the opportunities offered him. One too poor to have nourishing food, or to live in a room or house which affords the comforts, as to warmth and sunlight,

which to the invalid are absolute necessities, had much better remain at home. The invalid should not be encouraged in the belief that he may dispense with medical advice. If ever needed, it is when away from home, in a country and under conditions entirely new to the patient; besides, if there is any advantage to be derived from the climate, the intelligent medical man is the one most likely to fully utilize it. The patient, if at all advanced in phthisis, should not be allowed to think that a few months' residence in a salubrious climate will materially benefit him. There is rarely enough gain in a few months to warrant the fatigue of a long journey or the necessary expense. If a change of climate is really needed, that change includes a protracted or permanent residence.

As to Southern California, with its great distance from the east, additional considerations enter. The invalid is always strongly tempted to play the tourist, for there is much to be seen, and many a person has sacrificed his last chance by traveling from place to place, foolishly expending precious strength and recklessly incurring exposure which is incidental to all travel. The selection of the particular spot best adapted to the needs of the patient also offers difficulties which are best left to some reputable local practitioner whose knowledge of the conditions necessary to the welfare of the sick, even in the details of daily life, is invaluable to an invalid.

Wherever a patient may find himself, at home or seeking the benefit of a change of climate, certain precautions must be taken. He must have an abundance of *air*; the house and rooms he lives in must be kept well ventilated and not overheated; a temperature of 65° is usually quite enough for a living-room, and 55° is not often too cool for the bedroom. If, however, more warmth is demanded, the patient's wish should be gratified. A cold, damp room is highly objectionable, especially near the seashore; consumptives living near the ocean must occupy a room with a southern or southeastern exposure, containing provision for heating it when the weather is chilly or the atmosphere damp. Draughts must be carefully avoided. *Sunshine* is healthful in any country, and is to be courted assiduously. Consumptives may find an inducement to do so in Koch's statement that tubercle bacilli are killed in from a few minutes to a few hours by direct exposure to sun-

light, and die in five to seven days in ordinary sunlight. As to *clothing*, it must be suited to the climate and season; invalids away from home will find woollen garments of proper weight the best for all purposes. One visiting Southern California should always, even in mid-summer, be provided with medium weight underwear; in the case of women, the thin summer goods so extensively used in the east are practically useless. Both undergarments and the outer dress must be high in the neck and long-sleeved. The throat and neck should not be especially wrapped, and chest-protectors and similar devices are not to be tolerated. However, extra wraps must always be at hand to prevent standing or sitting in a current of air without additional protection or for use toward evening, and at all times when driving. The matter of proper *diet* often constitutes an intricate problem. Usually it is safe to allow a patient absolute freedom, particularly in the majority of advanced cases where an attempt to prescribe a strict diet is often followed by a refusal to eat anything. Generally speaking, nitrogenous foods are most valuable; hydrocarbons come next, carbo-hydrates last. "The American custom of three stated meals daily is a good one. In addition, food should be taken at suitable intervals between the stated meals and at bedtime. Rarely more than three hours, never more than four hours, except during sleep, should elapse between the times of taking food; and not only should a glass of milk, cream, or milk-punch be taken just before going to bed, but there should be something of the kind, or perhaps a glass of wine or spirits, with some suitable meat-preparation, like liquid peptonoids, by the bedside within easy reach of the patient in case of waking during the night or early morning." *Bathing*, even in adults who are unaccustomed to it, must be practiced with some care to gradually inure the patient to the cold. Sponging in cold water each morning is commendable when it is kindly borne; the shower bath, and almost any other kind of bath, is useful if practiced intelligently and when grateful to the patient. But it is folly to insist upon making a routine treatment of bathing, for often it proves exhausting and mischievous. *Exercise* in the open air, driving, riding, rowing, fishing, hunting, walking, swimming, calisthenics, etc., are also great helps, always provided that excess, especially in the use of the

upper muscles of the body, is carefully avoided. A corresponding amount of *rest* must be enjoined, and everything done to insure an abundance of refreshing sleep at night and, if necessary, during the day.

It requires good judgment and wise management to so regulate the daily life of the patient as to look after all these details without being "fussy" and without making the invalid selfish and unreasonably exacting from persons with whom he is brought in contact.

Local treatment, usually by means of air impregnated with medicinal agents, has been extensively practiced. The use of oxygen, compressed air, carbon dioxide, and similar substances, does not properly belong under this head, and will not be discussed here because, like the specific treatment of Koch, it not only belongs to the field of the specialist who has extensive apparatus and facilities beyond the reach of the general practitioner, but because the results actually obtained are by no means reliable or encouraging.

The same may be said of the treatment by sulphuretted hydrogen, iodine, kreosote, and other agents inhaled. The improvements occasionally had under their use are uncertain and too trifling, so far, to even form a valuable adjunct to the "indicated remedy." As antiseptics, beechwood kreosote, guaiacol and eucalyptus have proved of some service. They are used by means of a wire cloth inhaler, containing a sponge or cotton saturated with the medicine. Beechwood kreosote is more frequently used. It is diluted with an equal quantity of alcohol, one drachm being required for an hour's inhalation. The phthisical cavity may be treated directly by a weak, antiseptic solution of kreosote or iodine, injected by means of a hypodermic syringe provided with a long needle.

Treatment of Special Symptoms.—*Cough* constitutes one of the most persistent symptoms of which the patient begs to be relieved. The annoyance and suffering resulting from the inability to control it are so great that often it is difficult to resist the patient's pleading for morphine or some agent that promises to give temporary relief. Readily admitting that laryngeal irritation is often relieved, at least for a short time, by small doses of morphine, it is yet safe to maintain that such treatment is unsatisfactory. Goodno offers some excellent ad-

vice concerning the management of the cough, calling attention to the necessity of carefully studying each case for the purpose of removing whatever may irritate the respiratory organs and provoke *unnecessary* coughing, for it must be remembered that a certain amount of coughing is necessary to get rid of accumulated secretions. Good ventilation of rooms, restful, quiet and good cheer before retiring, proper assistance in undressing, due preparation of the bed, not forgetting soft flannel sheets, care to keep the room of the patient free from tobacco smoke and from unpleasant, irritating odors,—all these must be looked after, and will often prevent unnecessary coughing. The wise use of stimulants and close attention to diet and digestion are also helpful. Catarrh of the larynx, pharynx, naso-pharynx, ulcerations in the throat, in fact, any abnormal condition of the respiratory organs which can be reached, must receive prompt treatment. The remedies oftenest of service are: PHOSPHORUS, BRYONIA, CALCAREA, LYCOPODIUM, STANNUM, SULPHUR, KALI CARBONICUM, BELLADONNA, HYOSCYAMUS, IODINE, IPECACUANHA, ANTIMONIUM TARTARICUM, SANGUINARIA, ARSENICUM, LOBELIA, LACHESIS.

The *pains* in the chest are usually pleuritic, often myalgic. If the former, perfect rest and the use of ACONITE, BRYONIA, RANUNCULUS, KALI CARBONICUM, with the application of heat and mild counter-irritation (mustard-draft), are usually sufficient. If myalgic, a bandage firmly applied to the chest is frequently very helpful, with ACONITE, CIMICIFUGA, BRYONIA, and remedies of that class, supported by a generous diet. Goodno recommends NITRATE OF ACONITINE, 3x, repeated every hour.

Fever, if moderate, requires no special treatment. It is usually much relieved by having a change of climate. The writer knows of cases who for weeks had a continuously elevated temperature and arrived on the coast with the fever almost wholly and permanently broken. Perfect rest must be enforced when the temperature runs high. The remedies which promise most are: BAPTISIA, FERRUM PHOSPHORICUM, ARSENICUM, ARSENICUM CHININ., ACONITE. The "tar-products," especially phenacetin and acetanilid, in three-grain doses, and more, are very commonly used, but possess slight, if any, permanent value.

Night-sweats constitute one of the most perplexing special symptoms of phthisis. The remedies homœopathically indicated are: ARSENICUM, CHINA, SAMBUCUS, PILOCARPINE, IODUM, and the mineral acids.—AGARICIN (agaric acid), in doses from $\frac{1}{8}$ to $\frac{1}{4}$ grain, two or three times daily, has been highly recommended.—ATROPINE SULPHATE (in a solution of one-half grain to half an ounce of water, three to seven drops at bedtime) is a standard prescription; it must be given cautiously, at no time exceeding ten drops of the solution at one dose. If ten drops at a dose has proved inefficient, after several successive nights, the dose must be divided, giving five drops about two hours before retiring, the balance when going to bed. After a week's time the dose must be reduced, by one drop each night, and omitted as soon as possible.—HOMATROPINE ($\frac{1}{4}$ grain by injection), PICROTOXIN (gr. $\frac{1}{60}$ at bedtime), CAMPHORIC ACID ($\frac{1}{30}$ grain at night-fall, in a capsule), and STRYCHNINE (a full dose at night), have each their warm advocates. Sponging in a solution of two drachms of chloral hydrate in about two gobletfuls of brandy and water, in equal parts, is recommended by Nicolai and has been of service in a number of unmanageable cases. Sponging in dilute vinegar is often helpful.

Hæmorrhage demands the exhibition of IPECACUANHA, HAMAMELIS, ACONITE, MILLEFOLIUM, SECALE, LEDUM, FERRUM ACETICUM. Though invariably alarming to the patient and friends, it is not often fatal, and by relieving the congestion may actually be helpful. If slight, it may be safely ignored. The patient must be kept quiet physically and mentally, must not be allowed to talk, and should be kept in a position to favor the ready outflow of blood. Bits of ice in the mouth and an ice-bag over the heart are often useful. Table-salt in large doses is a domestic remedy of service in an emergency. Ergotine, hypodermically, or ergot by the mouth in ten to sixty minims of the fluid extract, every half-hour, then at longer intervals, is often useful by its physiological action. Oil of erigeron, oil of turpentine (5 to 20 minims on sugar every half-hour to hour), eucalyptol, aromatic sulphuric ether, extract of hamamelis, and others, may be added to this list.

Diarrhœa is usually controlled by ARSENICUM, SULPHUR, MERCURIUS, CHINA, PULSATILLA, NUX VOMICA, ARGENTUM NITRICUM. Injections of linseed-tea, to which may be added

from 30 to 40 minims of deodorized opium, are serviceable when there is ulceration of the large intestine. *Indigestion* commonly demands NUX VOMICA, PULSATILLA, CARBO VEGETABILIS, ARGENTUM NITRICUM, KREOSOTUM, LYCOPodium, ARSENICUM, FERRUM, and the moderate use of stimulants with the meals. If *vomiting* is marked, the throat may require special attention. Astringents, locally applied, often act nicely. If vomiting occurs every morning, a copious drink of hot water or hot milk, as soon as the patient awakens and before he raises his head from the pillow, is excellent. Mustard drafts over the epigastric region and ice to the nape of the neck are recommended.

Edema of the legs requires, in addition to ARSENICUM, APIS, and other indicated remedies, careful bandaging and rubbing of the limbs, which should be kept elevated. Ointments containing carbolic acid or starch poultices are useful when itching is troublesome. *Bed-sores* are not infrequent in tedious cases, and have been most successfully treated by dusting with iodoform, zinc oxide, subnitrate of bismuth, tannin, or, better, with iodoform collodion. *Insomnia* may be relieved by removing the cause through the agency of appropriate treatment; sponging, general or along the spine, hot foot-baths, a mild mustard draft to the epigastrium, occasionally cold water to the head, are also helpful.

The following remedies are useful in the constitutional treatment of phthisis:

SULPHUR, from the 6th to the 12th, and higher, when the patient complains constantly of being intolerably hot, with inclination to keep the feet outside the bedclothes; there is soreness in the upper chest; chronic, dry, hacking cough, with, occasionally, free discharge of purulent matter. Characteristic expressions of the scrofulous taint. Morning diarrhœa. Lack of appetite, but faintness if his meals are not served regularly. Tendency to venous plethora and hæmorrhoids. SULPHUR is of much greater value in the treatment of consumption than is usually recognized; it often does brilliant work, especially after pneumonia which does not resolve.—ARSENICUM is frequently indicated. Clapp has found it "one of the most valuable remedies for the tubercular cachexia." Its cough is accompanied with great dyspnœa, especially when lying down, which

obliges the patient to sit in an upright position; it is dry or has expectoration of frothy, glairy, stringy mucus, which later may become heavy, greenish, fetid. It is of particular value in the later stage, when the fever is almost continuous, burning dry, with great emaciation; haggard, drawn, grayish-white, waxy face; constant thirst; quick, light pulse; great depression of spirits; intolerable nervous tension. This nervous tension, often one of the most distressing symptoms, frequently yields under the persistent exhibition of ARSENIC, and I have derived benefit from Hempel's advice to use in such states three-drop doses of Fowler's solution of ARSENIC when the trituration fails. It often is of great service in the relief of gastric symptoms and of colliquative diarrhœa.—ARSENICUM IODATUM may be advantageously substituted if laryngeal complications are added to the ARSENIC-indications.—FERRUM METALLICUM is of service in the cough of persons of marked tuberculous predisposition, with soreness, fullness, and aching all over the chest; flying, stitching pains; dry, teasing cough; slight exertion causes a sense of great fatigue in the chest, flushing in the face, nosebleed, moderate hæmoptysis. Dyspnœa, relieved from warmth; fulness and pressure in the pit of the stomach. Painless, watery diarrhœa. Watery menses. Amenorrhœa. FERRUM PHOSPHORICUM is often substituted.—CALCAREA CARBONICA is particularly adapted to young people and women who possess peculiarities of temperament which belong to this remedy. It does brilliant work in the early stage, when the "drift" of the case is well pronounced, and there is a tendency to copious and too frequent menstruation in large women with full bust, lax fibre, glandular enlargements, and cold, wet feet. Digestion is deranged. There is a constant sense of great fatigue. Dyspnœa is easily provoked by exertion, especially by going upstairs. Cough may not be severe, or there may be coughing in the early part of the day, with copious, yellow, at times offensive, expectoration. When indicated, it acts promptly, and its effects are permanent.—IODUM. In the first stage, in young persons who are scrawny and bear the marks of scrofulous diathesis, as glandular swellings, deranged digestion, with voracious hunger and progressive emaciation. The cough is induced by tickling in the larynx and under the sternum; there is expectoration of stringy, transparent mucus, sometimes streak-

ed with blood. A solution of five drops of the tincture to the ounce of water, inhaled, is often serviceable when the larynx is involved.—**KALI CARBONICUM**. Stitching pains in different parts of the body, chest, teeth, etc. Cough severest in the early morning, at 3 A. M., with constrictive pain in the chest and throat, redness of the face, and sweat all over. Sense of hollowness in the chest, worse from talking. “Goneness” at the stomach, with belching of foul gas, better from eating. Expectoration of firm round masses, like a pea, flying from the mouth when coughing; copious, purulent expectoration. It is “beneficial both in incipient and later stages, especially for women run down after confinement or over-lactation.”—**PHOSPHORUS** should be one of our most valuable remedies, judging from its symptomatology. H. C. Clapp calls it the “king of remedies for phthisis” and states that he has seen more recoveries under its exhibition than under the use of any other single remedy. I have been less fortunate with it. It is an important remedy when the patient suffers from constant, dry, hacking cough, with pain and soreness in the chest and burning soreness in the larynx, much worse from coughing. There is hoarseness, especially in the evening. Dyspnoea. Aching in, and between, the shoulders; inability to lie on the affected side, and aggravation of cough from doing so. As the case progresses, the adaptability of PHOSPHORUS to phthisis becomes more and more striking. There is great exhaustion, emaciation, hectic, loss of appetite, painless diarrhoea, night-sweats, with expectoration varying in quantity and quality, rust-colored, bloody sputum being especially prominent. It acts best in tall, slender persons of light complexion, especially in young women.—**STANNUM** is well suited to those cases in which “weakness of the chest” is a conspicuous symptom. The chest is so weak that the patient cannot say more than a few words at a time; he must stop and rest to get his breath. His legs, also, are weak, and there is a great deal of general prostration. The cough is loose and rattling, the expectoration at first mucoid, later green and sweetish. There is pressure and bloating at the stomach after eating; chilliness alternating with flashes of heat; profuse night sweats. **STANNUM** should not be given too low. Even in the third trituration it often appears to check the cough and simultaneously cause a general aggravation of symp-

toms.—LYCOPodium is adapted to old people who have long suffered from pulmonary trouble. The indications furnished by Lilienthal are reliable; abundant, purulent expectoration, cough day and night, with bloody mucus or purulent, lemon-yellow, green or white sputa; hectic fever; rattling breathing, with dropped jaw and stupor from weakness and exhaustion after coughing; cold, clammy, sour, fetid perspiration; intercurrent pleuritic attacks, continual stitches on the left side with sensation of constriction in the chest. There is usually present the atonic dyspepsia, with much intestinal flatulency, "goneness" at the stomach, bloating and sense of distension in the abdomen, sallow, jaundiced complexion, and tardiness and slowness of the stool.

In addition to these remedies, consult ANTIMONIUM TARTARICUM, BRYONIA, IPECACUANHA, LACHESIS, RUMEX, SANGUINARIA, SPONGIA, BELLADONNA, HYOSCYAMUS, DROSERA, HEPAR SULPHUR., and SILICA.

The liberal use of hypo-phosphites and, when tolerated, of cod liver oil, maintained for a long time, is beyond doubt beneficial.

LARYNGEAL TUBERCULOSIS.

Tuberculosis of the larynx rarely occurs, but it may occur, as a primary affection. Usually it is secondary to pulmonary tuberculosis, from eighteen to thirty per cent. of the latter presenting laryngeal complications. In such cases the pulmonary symptoms are not always strongly pronounced; occasionally cases of extensive laryngeal involvement are seen when there is but slight tuberculous invasion at one apex. It affects men oftener than women.

Morbid Anatomy.—A laryngeal catarrh, with tubercles scattered through the mucous membrane, more abundant near the blood-vessels. By fusion larger tuberculous masses are formed which undergo caseation and ulceration, constituting flat irregular ulcers, sometimes deep and funnel-shaped, covered with grayish or yellowish exudation, and surrounded by thickened mucous membrane. The disease may extend in every direction, involving the cricoid cartilage, pharynx, and even fauces and tonsils. The involvement of the mucous and sub-mucous tissues is general and marked, often accompanied with

much œdema; infiltration of the muscular tissue promptly occasions vocal defects. The inter-arytenoid region and the epiglottis are most frequently the seat of active structural changes, resulting in great enlargement, distortion, and more or less destruction of the parts, especially of the epiglottis. Extensive ulceration more frequently takes place when the upper surface of the epiglottis is involved, and perichondritis and exfoliation of the cartilages may result. Stenosis of the larynx has been noted in comparatively rare cases.

The characteristic features observed with the laryngoscope are pallor and infiltration of the mucous membrane, infiltration of the vocal cords, and shallow, broad, grayish ulcers whose surface, according to Fraenkel, resembles sliced bacon.

Symptoms.—The symptoms resemble those of pulmonary phthisis, with certain additional, easily recognized peculiarities. Of these, one of the most striking is an early change in the *quality of the voice*, which at first becomes husky, then hoarse, and in the advanced stage often is entirely lost. The importance of this symptom, in connection with pulmonary tuberculosis, is sufficient to always arouse serious apprehension. The *cough*, at first laryngeal or simply that of the pulmonary affection, becomes hoarse and ineffective as the disease advances, accompanied with expectoration of purulent, possibly blood-streaked, matter, in some cases containing elastic tissue. There is frequently severe pain upon coughing, which radiates into the ears and grows in intensity as the disease progresses. *Dysphagia* is marked and distressing; it is nearly always present in the advanced stage, and grows worse as ulceration of the pharynx and epiglottis becomes more extensive. When the epiglottis is partly destroyed, every attempt to swallow brings on a violent paroxysm of coughing and strangling, which is intensely painful and exhausting, and greatly interferes with eating.

The diagnosis usually, is not difficult; in perplexing cases it may be solved by bacteriological examination. The prognosis is invariably grave, though somewhat more hopeful under modern methods of directly treating the throat.

Treatment—The general management of the case does not differ from that of pulmonary phthisis. The necessity of paying close attention to the throat is apparent. Cleanliness is of

great importance, and can be secured by spraying the parts with some alkaline solution, as boracic acid or chloride of sodium (10 grs. to the ounce of water), or Listerine diluted in two or three parts of water. This may be followed by a spray of menthol or eucalyptol in warmed vaseline. In indolent cases spraying with peroxide of hydrogen is useful. In more advanced cases sprays of a solution of iodine in alcohol are highly recommended, and not infrequently the direct application of a strong, even saturated, solution of iodine has been advantageously employed. I have found the inhalation of a weak solution of iodine, ten drops to the ounce of water, and even weaker when the throat was very irritable, by steam atomizer, persistently followed, of genuine benefit. Kramer's lactic acid treatment, consisting of the application of a 20 per cent. watery solution of the acid, gradually increased in strength, has proved satisfactory. If there is much pain, the insufflation, two or three times daily, of iodoform and morphia, the parts having been thoroughly cleansed, affords much comfort. Various other agents have been used, as solutions of tannic acid, nitrate of silver, or sulphide of zinc; the aniline dyes, especially pyoktanin, as spray in saturated solution or applied directly by cotton on forceps, has been urged; kreosote has its warm advocates. Peterson advises *Calendula* tincture, in solution of 1 to 20, with the addition of two or three drops of carbolic acid to the ounce.

Feeding may become difficult from the pain experienced upon swallowing. Spraying with a 4 per cent. solution of cocaine will give at least temporary relief. It is well to thicken all fluids taken, and to follow the method of Wolfenden, who directs the patient to hang his head over the side of the bed and suck the fluid used through rubber-tubing from a glass or deep dish placed on the floor.

Excision of the diseased tissue has been practiced by Heryng.

Therapeutics.—IODINE has proved one of the most efficacious remedies. Its great value in scrofulous and tuberculous conditions is generally recognized, and T. F. Allen's note that "it is particularly important to observe that it controls inflammation (with high temperature) of many, if not all, parenchymatous structures, particularly the lungs, when the indications permit its exhibition," is made good by experience. It is indi-

cated when there is violent hoarse, croupy cough, with tightness and soreness in the larynx, referable to one spot, ulceration, and muco-purulent or bloody expectoration. "When the ary-epiglottic and inter-arytenoid folds are thickened, the result of proliferation of connective-tissue elements." (Ivins.)

Mayerhoffer maintains that the iodides, as a class, exert a positive curative influence. He says: "The iodides of kali, natrium, and calcium, are of use chiefly as modifiers of the constitution and the diathesis. The preparations used are, usually, 1x five drops twice a day for two consecutive days, followed by a week's rest. Their influence is, however, not less marked on the lining of the larynx; the ulcer assumes a better aspect and shows a tendency to cicatrize. The iodides of mercury are of great service when there is much congestion, swelling and redness in any part of the laryngeal lining; healing ulceration. I commend to your attention the ARSENICUM IODATUM, 3x trit., in cases of deficient nutrition, when, notwithstanding a good appetite, the patient loses weight. The IODIDE OF BARYTA is to be preferred in enlargement of the tonsils and general indolent swelling of the glands of the neck. The AURUM IODATUM, 3x trit., I have found very useful in torpid ulcerations of the larynx, which resisted all other remedies, whether topical or internal. From the moment this agent came into action, there appeared almost immediately great vascular activity in the diseased parts, and the torpid ulcers made great strides toward healing. In one case which resisted for months the other iodine preparations, the cicatrization of the ulcers on the arytenoid lining was brought about in three weeks. In none of the cases where the IODIDE OF GOLD did good service could I trace any syphilitic taint." (Ivins: Diseases of the Nose and Throat.)

My own experience has demonstrated the particular usefulness of the IODIDE OF ARSENIC. Next in importance stands NITRIC ACID, when there is violent, dry, spasmodic, choking, exhausting cough, with sharp, stitching, knife-like pains in the (left side of) larynx.—PHOSPHORUS is indicated by laryngeal rawness and soreness from speaking, coughing, and from pressure upon the larynx, wheezing inspiration, aphonia, etc.—SELENIATE OF SODA was highly recommended by Mayerhoffer in cases where the expectoration consists of small lumps of

bloody mucus, and where there is hoarseness. J. S. Mitchell has confirmed its value in the early stage of the disease.

All remedies should be consulted which have a specific action upon the larynx, especially FERRUM PHOSPHORICUM, DROSERA, ARGENTUM NITRICUM, MERC. NITRIC., KALI BICHROMICUM, SANGUINARIA.

TUBERCULOSIS OF THE SEROUS MEMBRANES.

This usually is the result of direct extension from contiguous structures or is secondary in character. Cases do, however, occur in which the serous sacs appear to be the exclusive seat of tuberculous deposits.

Tuberculosis of the *pleura* is primary or secondary. The former is rare, especially as an acute manifestation; the exudations are of a sero-fibrinous or of a hæmorrhagic character. In the chronic form miliary granulations are found in the infiltrated connective tissue which separates the thickened and degenerated layers of the sac. The secondary form is quite common. The visceral layer of the pleura is invariably involved in pulmonary tuberculosis and there are found chronic inflammation, extensive adhesions, and tuberculous masses scattered throughout. Again, direct extension of the tuberculous process is not infrequent. Perforation of the pleural sac, at a spot where softening of the structure has taken place, resulting in pyo-pneumothorax, often takes place. The exudation may be sero-fibrinous, hæmorrhagic, or purulent.

The *pericardium* is less often the seat of tuberculous disease, and its recognition is attended with difficulty. In the majority of cases tuberculosis of the pericardium depends upon the existence of foci in the lungs or pleura, or it arises from invasion of tubercles through the mediastinal lymph-glands. Undoubtedly some cases of purulent pericarditis are tuberculous in character, though this fact can only be demonstrated by the existence of foci of tuberculous action elsewhere. The pericardium may also suffer as the result of general tuberculous infection or it may become involved by extension of the disease from other organs or structures, as the sternum, spine, or lungs. Tuberculosis of the *peritonæum* is quite common. It occurs at all ages, especially between twenty and forty. In children it is frequent, and closely connected with mesenteric and intestinal

affections. It generally is a part of miliary and of chronic pulmonary tuberculosis. It is almost always miliary in character, small gray granulations freely studding the peritonæal surface and in close relation to the lymphatic vessels. Careful examination of the omentum is often necessary to establish the identity of the process. It may be primary and local. Osler recognizes the following forms: *Acute miliary tuberculosis*, with sero-fibrinous or bloody exudation. *Chronic tuberculosis*, characterized by larger growths which tend to caseate and ulcerate. It may lead to perforation of the intestinal coils. The exudate is purulent or sero-purulent, and often is sacculated. *Chronic fibroid tuberculosis*, which may be subacute from the onset, or which may represent the first stage of an acute miliary eruption. The tubercles are hard and pigmented. There is little or no exudation, and the serous surfaces are matted together by adhesions. The *symptoms* are of a complex character. Sometimes, especially in the latent form, they are so vague as to escape recognition. If, on the other hand, the disease is of a very acute form, there are symptoms of enteritis, peritonitis, and even acute hernia, with excessive pain, abdominal tenderness, tympanitis due to inflammatory infiltration, and a temperature reaching 103° and 104°. When the onset is very slow, the low continuous fever, the abdominal tenderness, and the tympanitis give it a close resemblance to typhoid fever. In the chronic form the temperature may be quite low, even subnormal; tympanitis is present when there are extensive adhesions. Ascites, usually moderate, sometimes hæmorrhagic, is frequent. "It may simulate the effusion in cirrhosis of the liver, of which disease it is to be noted that tuberculous peritonitis is often a final complication."

A striking feature is the frequency with which tumors in the peritonæal cavity are observed. These are due to: a) puckering and rolling up of the omentum, usually seen in the umbilical, less often in the right iliac, region; b) sacculated exudations, more often found in the middle abdominal zone, flanks, or pelvis; c) thickening and retraction of the intestinal coils which may possibly involve the entire intestine; d) enlargement of the mesenteric glands. The diagnosis of these tumors is difficult; it depends chiefly upon the recognition of tubercular disease in some part of the body.

TUBERCULOSIS OF THE ALIMENTARY CANAL.

The *lips* are very rarely involved; if affected, the ulcer is readily mistaken for a chancre or an epithelioma. Tuberculous affection of the *tongue* is also rare. It appears as a small nodular prominence on the dorsum or edges, forming an uneven ulcer with rough, fatty base, resembling epithelioma and syphilitic ulcer. From the latter it is distinguished by the absence of glandular enlargement at the angle of the jaw and failure to improve under the persistent use of IODIDE OF POTASSIUM. The *hard* and *soft palate* and the *tonsils* are rarely involved. The *pharynx* may become implicated by extension of tuberculous laryngitis; its most striking symptom is the excessive pain caused by swallowing. The *œsophagus* is almost exempt, save the inconsiderable extension which is occasionally noted during laryngeal phthisis. The same applies to the *stomach*; only a few authenticated cases of tuberculosis of the stomach have been recorded; in some of these perforation by a tuberculous gland had taken place.

Intestinal tuberculosis is much more frequent. It may be primary, in the mucous membrane, and is then oftenest seen in children in connection with peritonitis or disease of the mesenteric glands. In adults it is comparatively rare. It is marked by symptoms of intestinal catarrh, fever, and colicky pain. If beginning in the caecal region, there are symptoms of typhlitis, which may gradually subside, to recur in a few weeks. Perforation into the peritonæum, or the formation of a pericæcal abscess, with perforation, may occur, in exceptional cases followed by partial healing and stricture of the bowel. Secondary involvement is, however, far more frequent. It occurs chiefly in connection with pulmonary phthisis, and by preference involves the ileum, cæcum, and colon. The mucous membrane and the solitary and agminated glands are first affected. The submucous and deep structures become involved in the ulcerative process, giving rise to perforation, peritonitis, and stricture of the bowel from cicatrization. The intestinal tuberculous ulcer is irregular and usually "girdles" the gut; its edges and base are infiltrated, often caseous; it dips deep into the intestinal structures, shows tuberculous inflammation of the neigh-

boring lymph vessels, and abounds in colonies of young tubercles in the serosa.

The *rectum* is frequently the seat of tuberculous disease in connection with fistula in ano in persons suffering from pulmonary phthisis. In these cases an operation is generally considered inadvisable; if the knife is used at all, free excision should be practiced.

At times intestinal tuberculosis is the result of extension of tuberculosis of the peritonæum, in which case extensive inflammatory adhesions may be formed, numerous foci of tuberculous inflammation may be scattered throughout the intestine, and perforation of the bowel may take place.

TUBERCULOSIS OF THE LIVER.

Of slight clinical importance, and rarely accompanied by local symptoms. It is a common feature of general tuberculosis, in which case the liver appears pale and fatty; the miliary granulations are so small as to be almost imperceptible. In some cases the finer bile-vessels are the seat of the invasion; if so, they resemble small abscesses, with soft center and bile-stained contents, and often are very numerous. Again, the liver is the seat of large masses of cheesy substance, varying in size from that of a hazelnut to an orange, or larger. Or a true tuberculous cirrhosis may exist, especially when there is tuberculous disease of the peritonæum and a peri-hepatitis, of which a sclerosis of the portal canals may be a feature. Ascites may be present.

TUBERCULOSIS OF THE GENITO-URINARY SYSTEM.

Tuberculosis of the *kidney*, as a primary disease, is not very rare. Usually, however, renal tuberculosis is secondary to a local manifestation of a general tuberculous invasion. It may occur at any age, but is more common during middle life, and is seen oftener in men than in women. The disease first attacks the pyramids and the calyces; necrotic changes and caseation take place; all the pyramids are rapidly invaded by colonies of tubercles, which soon extend to the mucous membrane of the pelvis. By extension downward, the ureters, sometimes the bladder, and in rare cases the prostate gland, become involved.

Both kidneys may be affected. As a general thing, one only is involved, presenting a series of cysts or cavities, filled with caseous matter in which lime salts may be deposited; or there may be thickening of the pelvic walls, with caseous nodules scattered throughout the organ, accompanied with necrotic changes and thickened and adherent capsule. The other kidney may remain normal; but more frequently it is superficially necrotic. The ureters commonly are thickened, there is ulceration and caseation of the mucous membrane, and possibly extension of the disease, in males, into the bladder, prostate, seminal vesicles, and testicles.

The *symptoms* are those of pyelitis so long as extension to the bladder has not taken place, and of very moderate severity for a considerable period of time; when advanced, loss of strength and flesh, emaciation, chills and irregular fever, and tenderness to pressure in the region of the kidneys are observed. In exceptional cases great distension of the pelvis exists. The urine contains albumin, pus cells, epithelium, tubercle bacilli, and at times flocks of caseous matter and blood. Extension into the bladder causes symptoms of cystitis. Spontaneous recovery has taken place; perforation of the cyst, with subsequent peritonitis, is a possible complication.

The *bladder* is rarely tuberculous, save as this results from tuberculous disease of the kidneys or other parts; the same applies to the ureters. Small ulcers, usually confined to the mucous coat, coalesce and form the large irregular tuberculous ulcer. The symptoms are those of vesical catarrh with frequent voiding of offensive, ammoniacal, purulent urine of, usually, normal specific gravity, containing albumin, pus, bacilli, epithelial cells, and other débris.

The *prostate gland* and *seminal vesicles* are often affected during tuberculous inflammation of the kidneys. Tuberculosis of the *testes* is not a rare disease. It may be primary or secondary, more often the latter. It is often seen in young children, even in the foetus, the tubercles here usually first affecting the tunica albuginea. It is an expression of general tuberculosis, and is always serious. In adults the substance of the testicles is first invaded. Caseation does not always result. An operation has been frequently followed by general infection.

The *Fallopian tubes* may be the seat of primary tubercu-

losis, usually bilateral, with enlargement, thickening, and infiltration of the tubes, caseation of their contents, external adhesions, and possibly extension to the uterus. Tuberculous salpingitis has been seen in young children; it may give rise to serious local disease, and may result in peritonitis. The *uterus* is rarely affected. Thickening and caseation of the mucous membrane of the fundus, and the appearance of nodules in the muscular wall mark the presence of the disease. Extension into the vagina is possible.

TUBERCULOSIS OF THE NERVOUS SYSTEM.

Acute miliary tuberculosis, involving the meninges and causing effusion, is the most important. Less frequent is a tuberculous *meningo-encephalitis* which generally is localized, occurs more commonly during the course of a pulmonary phthisis, and by the irritation due to the presence of the tubercle nodules sets up a train of very serious symptoms which differ widely, according to the size and location of the tumor. The so-called *solitary tubercle* is still less frequent; it consists of a tuberculous mass, greatly varying in size, at times as large as an orange, occasionally multiple, which gives rise to such symptoms as follow the presence of any other cerebral tumor. The last two forms are chronic, are found chiefly among young subjects, and usually occur in connection with tuberculous processes in other organs, especially the lungs.

The tubercle, on section, presents a cheesy appearance, is usually of considerable hardness throughout, save in the center where it may be quite soft, and is encircled by soft, translucent tissue; calcification may occur. Thickening of the pia mater, the formation of adhesions, interference with the circulation and resulting softening of the brain substance, pressure upon the nerve centers, and other disastrous results, are unavoidable. The same forms are found in the spine, producing symptoms of spinal meningitis or spinal tumor.

TUBERCULOSIS OF THE BLOOD VESSELS.

The existence of primary infection is doubtful. Osler states that tuberculosis may occur in a large artery and not result from external invasion. In the course of tuberculous disease of any organ, as the lungs, the walls of the vessels may become

infected, undergoing all the changes peculiar to the tuberculous process, the resulting softening of tissue frequently leading to hæmorrhage. Or, acute infiltration of the arteries may take place in tuberculous organs and cause thrombosis.

The blood-vessels, especially the veins, frequently become carriers and distributors of the infection, and thus play an important part in the history of tuberculosis.

SYPHILIS.

A specific disease, confined to the human race, chronic in character, propagated by inoculation over an abrasion of the skin or mucous membrane and by hereditary transmission. It has a long period of incubation, and clinically presents three stages of development: a) a primary sore at the point of incubation, with subsequent glandular enlargement; b) constitutional symptoms, with affections of the skin and mucous membrane; c) specific disease of the skin, bones, muscles and viscera.

Ætiology.—A micro-organism, described by Lustgarten, is probably the active element in the infection. It resembles the tubercle bacillus, but is somewhat enlarged at the ends. It is present in all syphilitic lesions and has only recently been distinguished from the smegma bacillus.

Infection may take place in various ways. In an overwhelming majority of cases it occurs during *sexual intercourse* with a syphilitic; not infrequently it is *accidental*, as, for instance, in surgical or obstetrical practice, the surgeon or obstetrician being inoculated through contact with a syphilitic patient or, if himself infected, conveying the disease to the patient by direct contact or through infected surgical, obstetrical, or dental instruments. Infection at the nipple from suckling a syphilitic child or, rarely, on the lips from the kiss of a syphilitic, or through the agency of humanized vaccine lymph (a mode of infection still called into question by many competent observers) are also examples of accidental syphilitic infection. Syphilitic ulcers about the mouth are commonly the result of vicious practices. *Hereditary transmission*, i. e. transmission of syphilis from parent to child, is frequent. If both parents are

syphilitic, one having infected the other prior to conception, the offspring of such intercourse cannot be expected to escape. If the father is syphilitic, but the mother healthy, the danger of transmission is great in the early stage of the disease, but the child may escape; each successive year materially lessens the danger of begetting a syphilitic child, so that the child of a father in the tertiary stage of syphilis is in little, if any, danger. The tenacity of the virus is, however, well shown in the comparative frequency with which a syphilitic child is born to a father who, at one time syphilitic, had apparently made a perfect recovery under appropriate treatment. A woman who has acquired syphilis is very likely to bear syphilitic children, even though the father be healthy. On the other hand, a healthy woman bearing a syphilitic child becomes herself immune, and cannot be infected; the child may infect the most healthy nurse, "yet it is never known to infect its own mother, even though she suckle it while it has venereal ulcers on the lips and tongue." (Colles's law.) If the mother become syphilitic during pregnancy, the child may, or may not, be syphilitic.

Whatever unduly taxes or weakens the system may be considered a *predisposing* cause. Hence ill health, unfavorable climatic conditions, the relative weakness of immature youth and of old age, alcoholic and other excesses, intercurrent attacks of severe illness, and all other depressing influences, by lessening the powers of resistance, certainly give to the infection a degree of virulency which it otherwise would not possess. A natural susceptibility to the action of the syphilitic poison appears to exist in some cases; not infrequently persons who are in the possession of splendid health and most favorably situated, will manifest symptoms of intense activity on part of the specific poison which cannot be explained upon other grounds.

The essential anatomical features of syphilis is cell proliferation.

ACQUIRED SYPHILIS.

For purposes of study a division into the three usually recognized stages is practical; yet, in actual practice these stages not only often blend into each other, but the order of their occurrence may be greatly changed; the secondary eruption, for in-

stance, may appear before the primary sore has cicatrized. The difference in the course of the affection, and its preference in individual cases for certain organs and structures, undoubtedly depends upon individual peculiarities which it is not often possible to recognize.

The *primary stage* begins with the appearance of the initial sore, and continues until the development of constitutional symptoms, covering a period of from five to twelve weeks. The initial sore (initial sclerosis, hard chancre, Hunterian chancre) is situated at the point of inoculation on the abraded skin or mucous membrane; hence, it is almost always seen on the genitalia. It is small, of dark-reddish color, and in itself causes slight annoyance except when irritated by chafing from clothing or other causes. It presents a hard, indurated base, due to cell infiltration, and is frequently coated with a gliary, thin, viscid secretion which gives to it a glazed aspect. It gradually increases in size, breaks in the centre, and leaves a small ulcer. The indurated character of the sore is of the greatest diagnostic value. The induration is easily detected by manipulation when the sore is situated on the prepuce, scrotum, labia, or lips; for evident reasons it is much less readily determined when the sore is on the glans penis or on the vaginal portion of the uterine cervix; in these situations it also is less papular and more frequently resembles a flat, slightly elevated ulcer. If inoculation results from vicious practices, the initial sore is probably about the mouth, anus or rectum; if accidental, on the fingers or hands. Exceptionally the primary sore may be wholly overlooked, as when it is situated within the urethra. It disappears within a few weeks, sometimes not for six or eight weeks. Excision of the sore does not affect the course of the disease.

The virus finding its way to the lymphatic glands, lymphatic adenitis, involving the lymph glands which anatomically are closest related to the seat of the primary sore, takes place, from the eighth to the fourteenth day after the appearance of the sore, and continues for, usually, six or seven weeks. The extent of this glandular enlargement depends somewhat upon the extent of the chancre and upon the number of glands with which the lymphatics closely related to the primary sore communicate. The enlargement is usually painless, rather tedious,

may involve the periglandular tissue, and on rare occasions may terminate in suppuration.

There is no impairment of the general health.

Secondary syphilis.—The first symptoms which denote constitutional involvement rarely appear earlier than the sixth or later than the twelfth week after the appearance of the initial sore. In some cases their approach is marked by general indisposition, weariness, loss of appetite and sleep, a considerable degree of nervous tension, and slight fever and headache which may be periodic and is usually worse at night.

The symptoms which are characteristic of secondary syphilis are: fever, anæmia, lesions of the skin, hair and mucous membrane, glandular enlargement, and sometimes affections of the eyes and ear. Collectively they constitute the earlier and milder lesions of constitutional syphilis, and continue for three, or more, months; in all save exceptionally severe cases they have run their course by the close of the second year.

The *fever* varies greatly. It may be so trifling as to be almost imperceptible, or it may be moderate and continuous in character, with a temperature only occasionally exceeding 101° ; or remittent, suggesting malarial origin, and often treated accordingly; in some of the latter cases the temperature may reach 104° , or more. Sometimes no fever is observed until late in the disease. It is almost always worse at the breaking-out of an eruption, particularly when of an ulcerative or pustular character.

Anæmia may be so pronounced as to border upon cachexia. The number of red blood corpuscles perceptibly diminishes at an early period, the percentage of oxyhæmoglobin lessens, and the number of white blood corpuscles increases. With the accession of an eruption these changes in the blood promptly increase, eventually returning to the normal state with the cessation of the second stage. No characteristic organisms have been found in the blood.

The *skin* presents distinctly characteristic phenomena, embracing a great variety of eruptions which still have in common certain features. The form which is usually first noted is a syphilitic *roseola*, an eruption of reddish-brown hue which appears on the chest, front of the arms and abdomen, but rarely on the face, and which continues for a fortnight or a

trifle longer. The *papular* form consists of groups of acne-like indurations about the face and trunk. The *pustular* form resembles the eruption of small-pox. The *squamous* syphilide appears like psoriasis, save that the scales are less abundant, thinner, less adherent and more superficial, and that the eruption is not confined to extensor surfaces. All these eruptions are accompanied with little, if any, itching or pain; are symmetrical in arrangement; they have a tendency to develop in arcs or curved lines; they are of a brownish-red, coppery hue, bluish or purplish when occurring on dependent parts; the *ulcerative* lesions, spreading by the convex margins and healing in the centre, have the shape of a horse-shoe; they leave behind them pigmentation; if pustular and ulcerative, the crusts are thick, formed in superimposed layers, and are loosely attached.

The *hair* falls out in patches, on the scalp, beard, eye-brows, eye-lashes, and elsewhere on the body, the result, chiefly, of destruction of the hair-bulbs in the process of the various eruptions. The *nails* become brittle and crack along their free margin; sometimes they are loosened and lost; chronic inflammation and suppuration of the tissues about the nail occasionally occurs, tedious in course and followed by the loss of the nail. Other changes have been observed, such as a curious thickening of the nail, especially at its free margin (hypertrophic onychia). All these are rarely painful.

Enlargement of the lymphatic glands is more marked during the earlier part of the second stage, at the time the eruptions first make their appearance, and reaches its full development when the eruption is at its height. "All the glands may become affected, and the disease is distinguished by the involvement of glands which in other diseases usually escape, as the glands behind the sterno-mastoid muscle and those behind the elbow." (Whittaker.)

The *mucous membrane* of the mouth and throat becomes hyperæmic, swollen and ulcerated as the fever and eruption appear; the ulcers are small, kidney-shaped, and present grayish-white borders. The ulceration may become extensive in the mouth and throat, even to destruction of the soft palate, epiglottis and vocal cords; it may dip into the trachea and bronchi, and is at times observed in the rectum. The so-called "mucous patches" are characteristic of this stage. They are

round, oval patches, slightly elevated above the surrounding healthy tissue, which easily excoriate and ulcerate. When ulcerated, they become moist and are covered by a thin, grayish film. Cellular infiltration and enlargement of the papillæ may be present when the skin is involved. Usually they are not painful to the touch; they vary in size from that of the head of a pin to an inch in diameter, often coalesce, forming a large sore, and are surrounded by a line of thickened and indurated tissue. They heal in from six to ten weeks without leaving a scar, save if ulceration was deep, in which case there is left a glistening cicatrix. Leucomata are whitish spots on the tongue; these are often seen in smokers. The "syphilitic warts" or condylomata consist of hypertrophied papillæ of the mucous membrane frequently seen about the vulva and anus; they are caused by friction from clothing or, at times, of opposing mucous patches situated on the buttocks. Among the more remote symptoms of this stage are iritis, choroiditis and retinitis. Of these, iritis is comparatively common; it usually occurs in the early history of the second stage, and, if severe and painful, should receive prompt attention. Deafness may follow extension of trouble from the throat into the ear. Epididymitis has been observed.

The *tertiary form* of syphilis, as to the intensity of its manifestations and the stubbornness of its symptoms, depends largely upon the care which the patient received during the second stage and upon "constitutional bias." If scrofulous, tuberculous, the victim of drink or of extreme poverty, or if previously neglected, or if the system is enfeebled from any cause, the third stage will probably be tedious and its symptoms severe. If the general health has been good and the patient has had intelligent treatment, the attack will probably be light, and he may wholly escape tertiary manifestations.

The characteristic symptoms of this stage are: syphilides, gummata, amyloid degenerations, and sclerosis.

The tertiary *syphilides* possess features which usually are well pronounced. As in the eruptions of the secondary form, a number of distinct eruptions may occur simultaneously on the body of the same patient (polymorphic), but they are not accompanied by fever. They are often seen in circular spots or in crescent-like arrangement, though asymmetric, unequal dis-

tribution is one of their essential features. Papules are frequent; they either heal without cicatrizing or they form deep, ugly ulcers bearing depressed scars, like "pitting." Syphilitic rupia is characteristic. It consists of pustules which scale over, break down, and form scales again. The crust is therefore laminated in structure and appearance, like an oyster shell. Large pustular lesions not covered in this way are called tubercular. They occur most frequently upon the back about the sacrum. All these lesions of syphilis destroy tissue and leave scars. They are sometimes attended with itching, which does not occur in the secondary eruptions. These late manifestations are not infectious or contagious." (Whittaker.)

Gummata are inflammatory products which develop in various organs or structures, producing results which differ somewhat in different locations. Thus, in the skin they break down, ulcerate and leave ugly sores which heal slowly and with difficulty; the same course is followed in the mucous membrane, and there cicatrization may result in serious mischief by producing narrowing, as in the larynx, or stricture, as in the rectum. In the solid organs puckering of tissue and malformations are common.

Gummata may be isolated and circumscribed or diffused; more frequently the former. They are nodular bodies, varying in size from that of the head of a pin to a small orange, grayish in color, firm or soft in consistency, translucent and enveloped in granulations or in contracted fibrous tissue. In rare instances these *gummata* are slowly absorbed, the skin over the site of their former location remaining thin and shrunken.

The tendency of syphilitic inflammations to caseation and cicatrization, with marked contraction of fibrous tissue, is responsible for those changes in the affected organs which constantly come under observation.

Amyloid degeneration is frequently seen in connection with the profound visceral changes peculiar to the tertiary form. *Sclerosis* will be considered incidentally.

The ravages of syphilis in this stage are so far-reaching and varied that a more extensive study is necessary to understand them.

Syphilis of the larynx.—In both inherited and acquired syphilis the larynx is often involved. In the inherited form this

involvement usually occurs early, within the first five or six months, or at puberty. Its symptoms are practically those of the acquired form, with hoarseness and loss of voice, cough with slight expectoration, difficult, sometimes labored, breathing, in paroxysms threatening actual suffocation or steadily progressing to asphyxia. Involvement of the pharynx and epiglottis is common, and leads to painful, difficult swallowing, which in the young child is both distressing and dangerous. Deep ulceration, perichondritis or œdema may be present, demanding intubation or tracheotomy.

In acquired syphilis laryngeal symptoms exist in the secondary and tertiary form. In the former there is erythema, going on to subacute laryngitis, with slight loss of voice, inconsiderable cough, and other evidences of laryngeal catarrh. Corresponding involvement of the pharynx and slight glandular enlargement (post-cervical) may precede or accompany the laryngeal symptoms. In severe cases superficial ulceration, surrounded by a deep-red zone, may occur, with muco-purulent expectoration; sometimes the ulceration involves the epiglottis, giving rise to painful deglutition.

In the tertiary form of syphilis the laryngeal involvement depends largely upon the presence of gummata and the changes which these growths undergo and cause in the surrounding structures. Deep ulceration is one of the most important and conspicuous. It is accompanied with considerable coughing, with copious expectoration of a muco-purulent character, containing also blood, epithelium, necrosed cartilage and other débris. Breathing and speaking are seriously impaired as the progressive infiltration, the cicatricial and other growths, and the œdema encroach upon the epiglottic space, tying down the glottis to the pharyngeal wall or fixing the vocal bands, or causing paralysis of muscles, or stenosis, possibly stricture, of the trachea; the same effect is caused by destructive ulceration of the parts. Pain or paroxysms of violent coughing, followed by suffocative attacks, may result from a slight effort, and may directly or through exhaustion lead to a fatal termination. When the ulceration is very deep and involves the cartilage, necrosis and exfoliation are common, and hæmorrhage may take place from erosion of an artery.

The deep ulcer, which may be single or multiple, is irregular,

has raised, ragged edges, its floor is of a dirty yellowish white, and it is surrounded by a limited area of slightly inflamed tissue. The character of the inflammation is light; there is usually absence of severe pain; the parts heal readily, but serious deformities often remain, due to cicatricial formations.

Usually the color of the mucous membrane is of a dark purple, sometimes grayish-yellow from chronic changes in the deeper tissues; the vocal bands are congested, ulcerated, more or less extensively destroyed. Gummata on the epiglottis are pale, elsewhere of the dark color of the surrounding membrane, yellowish in the centre as they approach ulceration. The tendency to extensive tissue formation plays an important rôle here as in other phases of syphilitic action. It shows itself especially in the parts immediately surrounding an ulcer, and is responsible for the deformities which so constantly result.

The diagnosis from tuberculosis and cancer rests largely upon the history of the case, the presence or absence of syphilides, and the appearance and character of the ulceration. "Two of the distinguishing features of syphilitic ulceration are: The usual absence of pain and the inflammatory areola which surrounds the ulcers; in phthisis the pain may be constant, but aggravated by deglutition, and the surrounding tissue is rather anæmic. In syphilis the superficial ulcers are usually multiple and generally oval, with dark-red areolæ; those of phthisis, though frequently multiple, are usually very irregular in outline. The deep ulcers of syphilis are generally single with overhanging edges, and occupy the sides of the organ; in phthisis, on the other hand, the ulcers are not deep, and are prone to attack the posterior portion. In syphilis, the anterior portion of the epiglottis suffers more; in phthisis, the posterior surface. The ulcers of syphilis show a tendency to heal readily and leave marked cicatricial deformities; those of phthisis heal very sluggishly and leave almost no deformity, the ulcer filling with granulation tissue almost as fast as the process of destruction goes on. Syphilitic ulceration is an acute process; phthisical, usually chronic. The ulcers of syphilis often attack the pharynx; those of phthisis rarely. The syphilitic mucous membrane is purplish; phthisical, anæmic. In phthisis and cancer there is usually lancinating pain, which extends along the Eustachian tubes to the ears; this is rare in syphilis. Degluti-

tion is usually difficult, painful or impossible in phthisis and cancer; rarely marked in syphilis except in adenitis. Cancerous ulceration requires weeks for its development; tuberculous, months; syphilitic, a few days. The anterior and posterior cervical glands are affected in syphilis; the posterior, rarely in cancer and never in phthisis; the anterior may be involved in either. More characteristic lymphatic enlargements are found, however, at the cornua of the hyoid bone; very early affected in most cases of cancer; late and occasionally in syphilis and phthisis. A fibroid degeneration is an infrequent tertiary syphilitic change; this sometimes undergoes ulceration, from which cancer can be best differentiated by consideration of the previous history and the coexisting syphilitic lesions. Lupus shows some general resemblance to syphilis, but it is very rare, and always presents other distinctive manifestations." (Ivins.)

The prognosis is good in the secondary, and serious in the tertiary, form. As to the latter, complications which may bring about a fatal result have already been mentioned. If not any of these occur, the patient will probably make a good recovery, save impairment of voice and deglutition in case the bands were ulcerated or fixed or if extensive destruction of the epiglottis had taken place.

Treatment.—Common sense suggests the necessity of doing everything possible to support the patient and to improve the general health. Locally, the parts are to be kept scrupulously clean. Spraying with sulphate of zinc in glycerine or fluid vaseline, five grains to the ounce, is useful in the early stage. Erosion and ulceration having become established, iodine, in glycerine or fluid vaseline, five grains to the ounce, is highly recommended; it is to be used stronger, even fifteen grains to the ounce, in deep ulcerations of the tertiary form.

The treatment of stenosis by gradual dilatation and of excessive dyspnoea by intubation or tracheotomy are surgical measures which cannot be discussed here.

The remedies most frequently useful are: KALI IODATUM, KALI BICHROMICUM, AURUM, NITRIC ACID, MERCURIUS. Their indications will be given later.

Syphilis of the nervous system.—Primary syphilitic affections of the brain practically consist of the presence of gummatous growths or of scattered foci of sclerosis, with a strong tendency

to undergo fatty degeneration with softening of surrounding tissues. The larger gummata constitute tumors of varying size, at times exceeding the size of a walnut, more often found in the cerebrum, usually multiple, and almost always attached to the meninges, preferably the pia mater. When small, they have a translucent appearance and are of uniform consistency; when large, they are soft and caseous in the centre. The tumors may undergo cystic degeneration. The meninges in the neighborhood of the gummatous tumors become involved in thickening and infiltration, especially in the pia mater, and gummatous disease of the arteries, running a subacute or chronic course, is frequently present. A gummatous peri-arteritis may develop, with ovoid nodules in the middle coat of the vessel.

The secondary brain symptoms either consist of important changes which result from the conditions described, including softening of the cerebral tissue from extension of the meningeal affection, or they are due to arteritis, or to hæmorrhage caused by weakening and rupture of the walls of the vessels.

The nerve centres may be affected, especially when syphilis is acquired. In the inherited form the symptoms of tumor may occur early, in exceptional cases as late as the fifteenth or twentieth year. In the acquired form they are among the late manifestations, and on this account often perplex the diagnostician; sometimes, however, convulsions have occurred within a few months from the inception of the primary sore.

The *symptoms* of cerebral syphilis are practically those of cerebral tumor, differing in detail and in the mode of their onset. In some cases a change in the mental condition is the first symptom observed; the patient is morose, stupid, fails to remember common occurrences, and complains of dizziness and headache; finally convulsions set in, preceded, often, by delirium. In others torpor is the most striking symptom, with headache, eventually culminating in an epileptiform seizure or a hemiplegia. Or dementia paralytica gradually develops, especially in cases where there has been no evidence that the disease had concentrated upon any particular portion of the brain; these cases may not have convulsions until very late, and it is held that they are not amenable to specific treatment. In still another class hemiplegia, with or without loss of consciousness, suddenly takes place, or a train of symptoms develops which

points toward the existence of a brain tumor, and of which the convulsive element overshadows all others.

The *syphilitic headache* is one of the most striking and, of the earlier, most persistent and characteristic symptoms. It may be paroxysmal, and frequently has well defined periods of maximum and minimum intensity; nightly exacerbations are commonly, but not invariably, present. External tenderness may exist when the dura mater or the pericranium are affected. The *convulsions* are those of organic disease of the brain or of the meninges, severe and of long duration, and often associated with loss of muscular power. Epileptiform convulsions developing after the twenty-fifth or thirtieth year are very liable to be of syphilitic origin,—a fact of great practical value. The *paralyses* of syphilis are varied, their distribution depending upon the area of the brain which is involved. They are complete when the result of rupture of a vessel from syphilitic arthritis; otherwise the motor function of the involved part is not wholly lost. Transient paralyses also occur, with or without loss of consciousness, at irregular intervals, and pass away quickly. It is stated that paralysis of one or more oculo-motor nerves is positive proof of syphilitic origin of the paralysis; the same applies, with less force, to a cerebral paralysis which follows a spinal lesion with a period of health intervening.

Syphilitic coma, described by Althaus, aphasia, and various forms of mental degeneracy are among the conditions which may occasionally be seen, but are of interest to the specialist only.

The symptoms of *spinal syphilis* arise: a) from the presence of gummata, of smaller size than those found in the brain, attached to the meninges, practically constituting tumors; b) from involvement of the spinal meninges, with inflammatory changes which give rise to muscular irritation and spasmodic action; c) to sclerosis, a late manifestation of syphilis.

The important points of diagnosis are: history of the case, including evidence of primary lesion; the multiple character of the manifestations; the age of the patient at the time convulsions first appear; the effect of "specific" medication.

Syphilis of the lungs.—A disease of rare occurrence and exceedingly difficult of diagnosis. It is found in the following forms: *White pneumonia of the fœtus*. The lung is extensively

involved, firm, heavy, airless. The alveolar walls are greatly thickened and infiltrated; the air cells are filled with desquamated and swollen epithelium. On section the lung appears of a grayish-white,—the “white hepatization” of Virchow.—Gummata of different sizes are scattered through the lungs, of grayish-yellow, cheesy appearance, imbedded in translucent connective tissue. The bronchi are usually involved, and diffuse broncho-pneumonia is seen about the gummata.—A sclerosis of the inter-lobular tissue, proceeding from the pleura or from the root of the lung, involving a portion or portions of the root of the lung, sometimes with the presence of gummata, and known as *fibrous interstitial pneumonia*.

Syphilis of the Liver.—A syphilitic affection which is common in the inherited, and comparatively frequent in the acquired, form of syphilis. The following are recognized: a) diffuse syphilitic hepatitis; b) gummata; c) syphilitic involvement of Glisson’s sheath.

Diffuse syphilitic hepatitis is very common in the inherited form, consisting of an increase of connective tissue, with atrophy of the liver cells, scattered foci of “small-celled” infiltration, in some cases forming nodules of considerable size and even miliary gummata. The liver is yellowish, enlarged, hard and resistant, compared by Trousseau to sole-leather. The entire liver or parts of the organ only may be involved.

Gummata in the liver are pale, grayish nodules varying in size from that of a pea to a marble, which in the process of healing produce deep scar-like depressions on the surface; these, if numerous, give to the organ an appearance somewhat resembling a bunch of grapes (botyroid). They usually undergo fibroid changes, but may soften and form a fluctuating tumor.

The changes in *Glisson’s sheath* are a thickening of the capsule which results in peri-hepatitis and increase in the connective tissue in the portal canals, the fibrous tissue formation often producing deformity of the viscus which is easily recognized on section.

The *symptoms* are those of cirrhosis, with slight jaundice, digestive disturbances, emaciation, and ascites. Great irregularity in the surface of the liver, after tapping, is strongly diagnostic. Dull, heavy pain, worse from motion, is often present. In other cases anæmia is well pronounced; urine is passed freely,

and contains albumin and tube-casts. Both liver and spleen are enlarged. Dropsy may supervene. After death, amyloid degeneration of the spleen, of the intestinal mucous membrane and of the liver have been seen, the liver containing gummata.

The diagnosis of syphilis of the liver depends chiefly upon the marked existence of hepatic lesion, especially enlargement and irregularity of the tumor, without serious impairment of the general health and the development, incidentally, of characteristic syphilitic lesions.

Syphilis of the Digestive Tract.—The *œsophagus* is rarely involved; if so, stenosis is the most important effect. In the *stomach* gummata are occasionally seen. The *stomach*, the *small intestine* and the *cæcum* may be the seat of syphilitic ulceration. The *rectum* and *anus* are often affected. In the early stage of the disease erosions about the anus and mucous patches, differing somewhat in appearance, are frequently present. In the secondary form ulceration about the anus is common. In the tertiary form are found the more serious affections of the rectum, especially in women, resulting from the presence of gummata in the submucosa close to the internal sphincter; the affection is essentially chronic and results in stricture. The good general health of the patient, the tedious course of the disease, the character of the rectal narrowing, the absence of an elevated, crater-like ulcer and of intense pain, establish the differentiation between it and malignant disease.

Syphilis of the heart and blood vessels.—*Syphilitic myocarditis* usually occurs as a diffuse fibrous induration. Gummatous tumors of the myocardium have been found. In either case the results are grave, since sudden death or rupture of the heart may occur. *Post mortem*, recent and old myocarditis with warty syphilitic growths and gummatous and warty growths on the valves have been found.

Arterio-sclerosis and *aneurism* may result from syphilitic affection of the vessels. The so-called *obliterating endocarditis* consists of a general infiltration of the inner coats with small cells and a proliferation of the subendothelial tissue, giving rise to a progressive narrowing and eventual obliteration of the entire lumen. The specific character of this affection is determined chiefly by the presence of gummata in other parts. *Gummatous periarteritis* consists of the formation of roundish,

ovoid enlargements in the adventitia of the artery, sometimes involving the intima. This infection is distinctively syphilitic, involves the smaller vessels, and is often found in the cerebral arteries.

Syphilis of the kidneys and testicles.—Secondary syphilis occasionally presents a nephritis, characterized by œdema, particularly of the face and eye-lids, malaise, and scanty urination. The urine is turbid and rich in albumin; the microscope shows the presence of blood-cells and epithelia, and granular, epithelial, and blood-casts. Improvement shows itself after a short time; hyaline casts take the place of the granular casts; the urine becomes normal, and general health appears to be restored.

Gummata are occasionally observed, especially in cases where the liver is gummatous. Neither form is of importance clinically.

Syphilis of the testes occurs in the form of gummata and closely resembles tuberculous disease. The syphilitic affection usually is painless, rarely breaks down or suppurates, the induration is hard, involves the body of the gland, quite exceptionally the epididymis (see tuberculosis of the testicles). An interstitial orchitis, followed by fibroid induration and atrophy of the gland, slowly progressive and painless, has also been observed.

CONGENITAL SYPHILIS.

Congenital syphilis is in the main characterized by the same symptoms which belong to the acquired form. The existence of an initial sore is, of course, out of question. In some cases the condition of the child at birth is such that it at once arouses suspicion. It is poorly developed, badly nourished, and often shows an eruption on the skin, usually a pemphigus about the wrists, ankles, hands and feet, with "snuffles," sore and ulcerated spots about the mouth, fissures, and almost always enlarged liver and spleen. The bones frequently are diseased, even to separation of the epiphyses. In other instances the child seems perfectly well, but in a month or two syphilitic rhinitis (snuffles) develops, with bloody or seropurulent discharge, progressing to ulceration, necrosis of the bones of the nose, and that depression at the root of the nose

which is characteristic of congenital syphilis. In the course of the affection breathing is impeded and extension of the catarrh into the ear may give rise to deafness. As in the acquired form, the eruptions play an important part. In this case they are erythematous, eczematous, often papular, and frequently reddish-brown patches with well-defined edges, which almost always first appear about the nates. Syphilitic rhagades, fissures about the angles of the mouth, sometimes in the median line, develop next, with discharges that are exceedingly virulent and dangerous to any surface with which they come in contact. Falling out of the hair, eye-brows, and lashes, and affections of the nails now appear, with only slight glandular involvement. Restlessness, malaise, and sleeplessness accompany the symptoms.

The bone-lesions of congenital syphilis, consisting of a chronic gummatous periostitis, usually show themselves after the sixth year. They affect the long bones, preferably the tibiæ. The nodes are symmetrically arranged, lead to great thickening of the bone, and are not usually painful. Affections of the eye, keratitis and iritis, and of the ear, the latter generally resulting in deafness, set in about the period of puberty, and later; sometimes the bone lesions first appear at this time, or even later. Enlargement of the spleen, a syphilitic synovitis affecting the knee, and gummata of the liver, kidneys and brain, have also been observed.

The general health of the child, especially its nutrition, may either remain unsatisfactory or what seems like complete recovery may take place. Yet, many high authorities point out the fact that even in the latter condition certain marks of syphilis remain which are readily recognized; they are so-called "infantilism" and an appearance of the teeth which Jonathan Hutchinson claims is characteristic of congenital syphilis. The term "infantilism," first used by Fournier, is self-explanatory; it refers to peculiarities of the face and skull which give to the patient, arrived at years of almost maturity, the expression and appearance of a young child, which is intensified by actual backwardness in intellectual development. As to the teeth of congenital syphilis, the permanent upper central incisors are peg-shaped, stunted, narrower at the cutting edge than at the root. The enamel on the anterior surface is perfect, but the

cutting edge is disfigured by a single notch of varying depth, in which the dentine is exposed.

The prognosis of congenital syphilis is grave. Kassowitz states that of syphilitic children one-third die before birth and one-third before the age of six months. The late manifestations are a constant menace to life and usefulness. The *treatment* is largely symptomatic, such remedies as MERCURIUS, NITRIC ACID and AURUM being most often indicated. Of the mercurial preparations, the milder salts, in young infants, are to be preferred. Inunction with mercurial salve is practiced by means of a flannel binder upon which the ointment has been spread, directly applied to the abdomen of the infant, and allowed to remain for two or three days; it is then removed, the child carefully washed, and the ointment reapplied. This treatment must be discontinued as soon as warranted by improvement of the case. Iodide of potassium is the recognized specific for the latent manifestation; Gilbert's syrup, *i. e.*, Merc. biniod., gr. 1, Potass. iodide, \bar{z} ss., water, oz. ii., 5 to 10 drops three times per day, the dose being gradually increased and the remedy continued for many months, is an excellent prescription for late manifestation with bone lesion.

The General Diagnosis of Syphilis.—In addition to the diagnostic symptoms already pointed out, the diagnosis depends upon extreme care and thoroughness in the examination of the case and of its entire history. The patient's own statements can never be considered conclusive. In women who habitually abort a persistent search must be made for proof of primary lesion, for affections of the skin and hair, scars in the throat and groin, or for traces of bone disease, etc. Osler points out the fallacy of the old teaching that relief in a case of suspected syphilis obtained by the exhibition of iodide of potassium is proof of the syphilitic origin of the case; he states that in several cases thus treated improvement followed, but "the subsequent course and the post mortem have shown that the disease was not syphilis."

The prognosis of acquired syphilis, so far as it concerns eventual recovery, is surprisingly encouraging when we bear in mind the seriousness and the complexity of its manifestations. Individual susceptibility plays an important role in the severity of these manifestations. Thus, a seemingly healthy person may

become infected, have skillful treatment, and yet become the victim of frequent and unexpected relapses, while another, appearing less healthy and having indifferent treatment, suffers but little and makes a good recovery. Experience shows that a trifling manifestation of secondary symptoms is often followed by violent tertiary symptoms.

The Treatment of Syphilis.—Prophylaxis may be summed up in the brief sentence “personal sexual purity.” Constant hard work at some absorbing occupation, regular hours and desirable associations are important aids in bringing about such a result. But sexual passion is not easily controlled, especially when opportunities abound for its gratification, and arguments have little weight when offered at the moment of intense sexual desire. It is nevertheless proper that medical men, as persons experienced in the ways of the world, should call the attention of men to the value of continence in its bearing upon the physical and moral welfare of the individual, the danger to self incurred by sexual immorality, the possibility of syphilitic infection, and the frightful responsibility of perchance entailing upon still unborn children so hideous an inheritance as is syphilis in any form. To the young man who aspires to a pure and happy home of his own, it may be wise to point out that the truly happy husband is he who has never been locked in the embrace of any woman save his wife, for to that man no woman but the wife has it in her power to gratify the fulness of his desire.

Equally important is the question of controlling, by police regulation, the so-called social evil. A physician should not deal with the sentimental side of this question, but should strive to educate the masses so they will indorse and second efforts in that direction. Let it be understood that the woman who sells her body for a money-consideration shall do so openly, that she may make this consideration proportionate to the charms sold, but that she must go into retirement when she becomes diseased. The woman who by choice or necessity lives an open life of shame is less an enemy to society than she who does so secretly, and venereal and syphilitic affections are less often propagated in the house of open prostitution than in the bed of the woman of loose virtue who yet attempts to wear an ill-fitting cloak of respectability. Leg-

isolation cannot make, and never will make, people pure; but it can somewhat reduce the mischief wrought by impurity of life.

The possible marriage of a syphilitic must also be considered. It should never be allowed until two, still better three, years have elapsed since the primary infection and at least one year since the latest manifestation of syphilis.

The drugs which have made the most remarkable record in the treatment of syphilis in the hands of the general profession are MERCURY and IODIDE OF POTASSIUM; when the latter is not kindly borne, the iodide of sodium is substituted for it. Whatever the remedy, the treatment must always be continued for a period of from one to two years, or longer.

MERCURIUS appears to be an almost specific for the secondary form. It may be given by the mouth, by inunction, under the skin, or by fumigation. The last two methods offer no particular advantage and entail unnecessary inconvenience. When given by the mouth, according to the dosage of the physiological school of to-day, the biniodide of mercury is preferred in doses of one-sixteenth of a grain, the protoiodide in doses of one-fifth of a grain, three times daily. Hydrargyrum cum creta is administered in one-grain doses, with equal parts of Dover's powders, from four to six times daily. If the drug is used in form of an inunction, one drachm of mercurial ointment should be thoroughly rubbed into the skin, on the inner surface of the arms or thigh, or on the abdomen or sides of the chest, for six consecutive evenings; a bath is taken on the seventh evening, and the inunctions recommenced on the eighth evening; this treatment is continued until there is relief or until salivation threatens. Special precautions must invariably be taken to avoid salivating the patient; the gums especially must be watched for indications of mercurial poisoning.

The tertiary stage, in all its manifestations, has been most successfully treated by the Iodide of Potassium (or the Iodide of Sodium). The most varied syphilitic lesions have been cured under its exhibition. The doses given must be not less than ten grains three times daily, and must be gradually increased until thirty-grain doses are taken. The most experienced specialists, men whose success and knowledge cannot be called into question, urge the necessity of large doses, especially when there is syphilis of the nervous system.

Physicians who base their prescriptions upon the "law of the similars" may justly claim that in very many cases the symptoms clearly call for the exhibition of mercury or of the iodide of potassium, and that in such cases satisfactory results have been obtained from the exhibition of very minute doses of these drugs. It seems probable that these minute doses act as specifically as do the larger doses of the physiological school, simply because the preparations employed have been subjected to a process of long-maintained trituration and minute subdivision which enables them to enter more readily into the system and to produce their specific healing effect in a shorter time, more permanently, and without producing the physiological effects which often result from material doses.

MERCURY.—**MERCURIUS BINIODATUS.** One of the most useful mercurial preparations when the soft parts of the throat are extensively involved, especially on the left side, and when the ulceration is rather superficial; the tongue is clean or coated yellow.—**MERCUR. PROTOIODATUS:** Syphilitic iritis. Involvement of the posterior wall of the pharynx, tonsils, etc., worse on the right side; empty swallowing; copious flow of saliva; the glands of the neck are hard and swollen; sticking, tearing, boring pains in the limbs, usually worse at night, in bed.—**MERCURIUS DULCIS:** A good remedy in infantile syphilis; face pale and looks like the face of a corpse; enlargement of the liver; oral mucous membrane pale, ulcerated; fetor from the mouth; salivation; small phagedenic ulcers in the mouth and on the tongue; coppery eruptions on the body.—**MERCURIUS CORROSIVUS:** Fever and pain accompany the symptoms. Ozæna, with ulcerated nasal mucous membrane; great burning soreness; thick, gluey, excoriating discharge; mucous patches in the mouth, with burning pain; ulceration of throat and soft parts, with great soreness; grayish ulcers, with burning pain, difficult swallowing, offensive breath. Syphilitic laryngitis.—**MERC. NITRIC.:** Superficial ulceration, with splinter-like pains. Mucous patches in the mouth.—**KALI IODAT.:** Profuse acrid coryza, with throbbing and burning in the nasal and frontal bones; discharge of thick, yellow mucus from the nose; deep ulceration in the throat, with glandular involvement. Syphilides, especially of papular character. Gnawing, boring bone-pains.—**KALI BICHROMICUM** is one of the most useful remedies. "It has

cured deep ulcers on the edge of the tongue, ulcers of the mouth and fauces; syphilitic laryngitis with dry, hoarse, hacking cough; fetid discharge from the nose; pustular syphilides; suppurating tubercles, forming deep, circular, 'punched-out-looking' excavations; caries of the bones of the nose; bone-pains with stitches, as if from sharp needles wandering all over the body (Trites in Arndt's System)." It is of great value in nasal involvement of infantile syphilis, with a tendency to perforation from ulcers; in the pustular form of syphilides the ulceration goes on beneath the scab; it always dips deep into the tissue; does not spread laterally.—*PHYTOLACCA* has many throat symptoms, usually accompanied with glandular enlargement, which suggests its use in syphilitic ulcerations of the throat; the parts are dark, livid, purple; swallowing is exceedingly painful and accompanied with intense tearing, shooting pain through the ears. These symptoms warrant its exhibition in secondary syphilis. Its chief value, however, depends upon its remarkable action in "bone-pains," when the long bones are affected, with continuous deep, burning pain. Syphilitic rheumatism, tearing and shifting, if in the joints, with redness and swelling, always with aggravations during damp weather. Syphilitic headache, of similar character, with deep, internal soreness and, at times, a sense of constriction.—*AURUM METALLICUM* has well-deserved reputation in the treatment of ozæna when the discharge is thick and exceedingly offensive, with much swelling of the parts and loss of smell. It is of value when the flat bones (palate, nasal, frontal, mastoid, etc.) are affected with burning pain, fetid discharge, tendency to caries and necrosis. It seems to act best in persons of fair complexion, in children and old people, and when there is great melancholy and depression.—*ASA FŒTIDA* is one of the best remedies in affections of the long bones, especially of the tibiæ, with a tendency to destructive processes. The pains are intense and of a throbbing character, sometimes cramp-like; the parts involved are very sensitive. It acts well in ulceration of the skin, very sensitive to the touch, with discharge of thin ichorous pus. After the abuse of mercury. Often the nervous symptoms of the remedy furnish important indications.—*NITRIC ACID* is used in ulceration of the mouth and throat, flat and spreading laterally, bleeding when touched, even though very

gently, with much salivation, soreness and splinter-like pain when swallowing. Ulcers on any part of the body, presenting these characteristics, point to NITRIC ACID. It resembles MERCURY in the nightly aggravation of its constrictive headache, "as if in the bones of the head;" it has bone-pains at night, worse from change of weather and dampness, caries of the flat bones (with splinter-like pains). Condylomata, copper-colored spots on the body, especially about the anus and on the chest.—FLUORIC ACID is useful in deep destructive processes; hence its value in syphilitic ozæna, caries and necrosis of bones, deep ulceration of the throat with much infiltration, great fetor, sensitiveness to cold, onychia, ulceration about the nails and phalanges of the fingers. The patient suffers much from boring, burning pain, which keeps him constantly "on the move." The discharges are thin and acrid. It has proved valuable in the syphilis of young children.—MEZEREUM has made a good record in relieving syphilitic bone pains. "In the mercurio-syphilitic diseases of the periosteum, periostitis, nodes, periosteal rheumatism; intense burning pain in the bones, worse at night; dark-red inflammation of the pharynx, with burning dryness; huskiness of the voice, with hawking up of mucus, worse in cold weather (Trites).

Remedies of less importance clinically are: THUJA (secondary form; condylomata; roseola; iritis, with gummata on the iris and severe nocturnal pain; rhagades); ARSENICUM IODATUM (cachexia; gummata); PHOSPHORUS (general tendency to fatty degeneration of organs; marasmus; headaches, with falling of the hair in circumscribed spots; exostosis of the skull, with violent tearing pain at night; necrosis of bones; painful laryngitis; locomotor ataxia; syphilitic psoriasis and roseola); LACHESIS, HEPAR SULPHUR., SILICA, BADIAGA, STILLINGIA SYLVATICA (syphilitic eruptions of the secondary and tertiary form, of torpid, scaly, obstinate character; moist, brown, excoriating eruptions on the scalp; syphilitic ulcers; dark-red, tubercular eruptions, with unhealthy ulcerations; bone pains, with nodosities on the skull and long bones); KREASOTUM (tertiary form; burning pains like red-hot coals).

RABIES.

Rabies, commonly called hydrophobia, is an infectious disease of frequent occurrence in animals, especially in the wolf, dog and skunk, more rarely in the fox, cat, horse, and cow, which may be communicated to man through inoculation from the bite of an infected animal.

Practically nothing is known of the nature of the poison of rabies save that it is met in the saliva and blood, that it can be successfully inoculated, and that it acts upon the central nervous system. The disease, as it occurs in man, almost always results from the bite of a dog or, in the West, of a skunk. Violent as is the action of the poison, not all persons bitten have rabies; owing to personal immunity and to imperfect infection, about one-half of the persons bitten by an infected animal escape. An infected animal may communicate the disease throughout the entire period of incubation. The seat of the infection is usually an exposed part of the body, as the head, face, arm or leg.

The period of incubation in man is exceedingly indefinite; in all cases it is remarkable for its length. In sixty per cent. it varied from eighteen to sixteen days; in thirty-four per cent. it exceeded two months; there are on record well-authenticated cases where rabies occurred from three months to a year, and even two years, after infliction of the bite.

Morbid Anatomy.—A perivascular accumulation of leucocytes, most marked about the vessels of the medulla and cortex and in the upper cord, was observed by Gowers in seven out of nine cases which he examined. The pharynx, larynx, trachea and bronchi are usually congested; the stomach often is hyperæmic. Minute hæmorrhagic effusions, especially in the medulla, have been noted in the brain. The lungs are congested, sometimes œdematous. Heart, liver and spleen are normal.

Clinical History.—The premonitory (*psychical*) stage is characterized, often, by radiating pain or anæsthesia about the seat of the injury, although the wound may have, and usually has, perfectly healed; at times the wound reopens. Indisposition, loss of appetite, restlessness, irritability, sleeplessness, and

a sense of some impending misfortune oppress the patient, rendering him profoundly melancholic. The special senses are excited, and a trifling disturbance, as a sudden bright light or a noise, cause great distress. The characteristic fear of water may show itself on the first day or later; the patient may suffer from thirst, but cannot drink, either because the act of swallowing is actually difficult or because he has a dread of attempting it. There is also burning and a sense of constriction in the larynx, often with huskiness of voice. After one or two days, the *furious (spasmodic) stage* sets in, chiefly marked by violent spasmodic action involving the larynx and pharynx, but also the muscles of respiration and those of the trunk and extremities. Every attempt to swallow water brings on violent spasms, and even the sight of it may throw the patient into convulsions. The convulsions last from a few minutes to half an hour; they occur at gradually lessening intervals, are accompanied with intense anxiety and oppression, and in many cases with strange sounds proceeding from the patient, like a hoarse bark, caused by the violent contractions of the laryngeal and pharyngeal muscles. "Any afferent stimulant, i. e., a sound or a draught of air, or the mere association of a verbal suggestion, will cause a violent reflex spasm. In man this symptom constitutes the most distressing feature of the malady. The spasms, which affect particularly the muscles of the larynx and mouth, are exceedingly painful and are accompanied by an intense sense of dyspnœa, even when the glottis is widely opened or tracheotomy has been performed" (Horsley). Intense thirst and burning pain in the throat torment the patient, from whose mouth saliva may issue in a copious stream; the pulse becomes rigid and full; the temperature rises to 101°, or more, scarcely ever exceeding 103°, and delirium and mania rapidly develop. It is remarkable that very often the patient, even though laboring under furious excitement, preserves a consciousness of his condition and of the danger to others of any injury he may inflict upon them, and exercises great control over himself not to bite or otherwise wound his attendants. The convulsions and suffering increasing in frequency and intensity, the patient may die during the height of a spasm within one to three days. If death does not occur in this stage, the so-called *stadium paralyticum* supervenes, the

utterly exhausted patient rapidly drifting into a condition of hopeless prostration, characterized by a gradual cessation of the spasms, weak and fluttering pulse, and death from syncope in from six to eighteen hours.

The diagnosis generally is easy. It rests chiefly upon the reflex character and nature of the convulsions. Rabies resembles *tetanus*, but lacks the trismus and opisthotonos of the latter, also its characteristic micro-organism; the period of incubation in tetanus is from three to ten days after the receipt of the injury, that of rabies much longer (see above). The diagnosis from *lyssophobia*, or fear of hydrophobia, a nervous disorder of not infrequent occurrence even among persons of strong will force and good judgment, may be difficult. In these cases the symptoms, though often of sufficient violence to demand the most careful attention and possibly resulting fatally from exhaustion, nevertheless lack much of the intensity of true rabies; hence the patient will safely pass the limit of the duration of true hydrophobia, a fact which in itself can be used to assure the sufferer of the harmlessness of his symptoms. Proof that the animal which inflicted the bite was not diseased is usually sufficient to quiet the fears of the sick one.

The prognosis in man is fatal. Wounds on the face are the most serious. Yet, Bollinger claims that of 200 human beings in France bitten by rabid animals, 133 were cauterized, and that of these 92 (i. e. 69 per cent.) remained healthy; of those not cauterized, 83 per cent. died of rabies.

Prophylaxis.—Since in nearly every case of rabies in man inoculation proceeds from the bite of a dog, a law compelling owners of dogs to keep them muzzled, on pains of having the animal shot on sight, would undoubtedly prove an amply sufficient preventive.

Treatment.—Treatment of the wound consists of disinfection and prompt and thorough cauterization by nitrate of silver, caustic potash, the red-hot iron, or the electric cautery. If this cannot be had at once, attempts should be made by the injured person himself or others to eliminate the poison by sucking the wound; it must not be forgotten that this measure might prove disastrous in case of an abraded surface about the lips or mouth. A ligature properly applied may prevent absorption. The application of a solution of corrosive sublimate (1:500 or 1:1000)

has been highly recommended. Excision of the injured parts or amputation of the wounded limb, in case of extensive laceration, may become necessary. The wound, according to some authorities, should be kept open for a period of, at least, six weeks, and if the surgeon is not consulted until healing has taken place, excision of the scar, including any swollen lymphatic glands in the neighborhood of the bite, should be promptly performed. Turkish baths have been advised during the period of incubation.

Under all circumstances no pains should be spared to draw the attention of the injured person from himself and to exclude everything that might aggravate his dread of possible serious consequences.

If symptoms of rabies have developed, confinement in a darkened room under the care of properly instructed attendants, not more than two at a time, with the use of morphine in appropriate doses, has been the standard treatment, chloroform being employed to lessen the violence of the spasms, and cocaine, locally, to relieve the hypersensitiveness of the throat. In view of the great difficulty of swallowing, it may become necessary to administer concentrated food per rectum.

Pasteur's Method.—Pasteur found that inoculation from rabbit to rabbit, continued from animal to animal through many generations, vastly increases the intensity of the virus, eventually reducing the period of inoculation to seven days. Dessication of the medulla of an animal treated with the most active virus in sterilized glass vessels in which pieces of caustic soda had been placed, reduced the virulence of the virus until it eventually became innocuous. Beginning with injections of this non-virulent medulla, followed with injections of emulsions of medullæ of increasing virulence, up to medullæ which had been dried only one or two days, he succeeded in rendering dogs thus treated absolutely immune to infection with the virus of rabies. Practically the same plan, i. e., inoculation beginning with weak preparations and repeated with stronger preparations of the medullæ of rabbits inoculated as described, is followed by Pasteur in the treatment of persons bitten by suspected animals. Of late, Tizzoni and Centanni, of the University of Bologna, have extracted a chemical vaccine from the central nervous system of rabbits dead from fixed virus, from

which they hope to obtain both immunity against infection and prevention of the disease after infection even when its initial symptoms have appeared.

As yet, opinions differ concerning the value of results actually obtained. Thus, the Society for the Protection of Animals from Vivisection, up to June, 1892, reports a list of 230 persons who died from hydrophobia after they had received treatment at some Pasteur Institute. On the other hand, Pasteur himself, in 1892, claims to have treated 1793 persons with only seven deaths, and of these three occurred from hydrophobia developing within fifteen days after the beginning of treatment. From 1886 to 1892, 12,782 patients were treated in the Pasteur Institute, with sixty-eight deaths, an average of 0.52 per cent.

Internal specific medication, at the hands of any school of practice, has accomplished little, though an attempt to class as lyssophobia all cases of reported cures of rabies, simply because cures were claimed, appears unwarranted. Cures have been reported under BELLADONNA (violent congestion, flushed face, brilliant and congested eyes, with dilated pupils and staring expression, throbbing pulse, hoarse, barking voice, spasms of the throat, inability to swallow, violent delirium, mania, strikes and bites, and attempts to get away), HYOSCYAMUS, STRAMONIUM, CANTHARIDES and other remedies.

Hydrophobin or *Lyssin*, introduced by Hering, may prove valuable, just as variolin has proved a most excellent remedy in variola.—Kuhner relates a case where a person violently ill from rabies devoured a piece of the root of SPIRÆA ULMER; a quarter of an hour afterward he became conscious, vomited gall, and slept profoundly for twenty-four hours, awaking recovered.—Ghose reports a case cured by eleven subcutaneous injections of PILOCARPINE HYDROCHLORIDE, $\frac{1}{5}$ grain each, in the course of seven days. He excised the scar and kept the wound open for two weeks previously, thus relieving the pain in it.—S. Kotack (Indian Med. Record) saw a remedy given to no less than thirty persons within a month after having been bitten by rabid dogs. In no case had rabies developed after a year. It proved to be an insect of the cantharides family, closely related to, but not identical with, cantharides vesicatoria; its administration in all the cases caused difficult and painful micturition,

with the passage, from the urethra, of a number of polypoid bodies.—Goss, of Georgia, claims to have had curative action from *ECHINACEA ANGUSTIFOLIA*, a teaspoonful of the tincture three times daily, and from *SCUTELLARIA*, sixty drops of the tincture every three hours. He cites several cases successfully treated with one or both of these remedies.

TETANUS.

Tetanus, also called trismus or lockjaw, is an intensely acute infection, due to inoculation with the tetanus bacillus through a wounded or abraded surface, characterized by tonic spasms of the muscles, the result of intense irritability of the reflex centres in the medulla and cord due to the physiological action of the toxins of the specific bacillus. The disease is of short duration and rapidly tends to a fatal termination.

Ætiology.—Tetanus, in the large majority of cases, results from trauma; it may be idiopathic.—The wound inflicted is of a trivial nature, such as is caused by running a splinter into the hand, a nail penetrating the foot through the sole of the boot, the sting of an insect, the abrasion of the surface from a blow or a fall, or the extraction of a tooth. Contused or punctured wounds are much more dangerous than cuts; gun-shot wounds frequently cause lockjaw; injuries to the nerves are still classed among the important exciting causes. Injuries of this class are most frequently sustained on the extremities, and statistics show that in a majority of cases trismus has resulted from hurts to the fingers, hands, or legs. The disease occurs oftener in hot countries than in temperate climates, and shows a striking preference for the colored races. It is comparatively frequent among the new-born (*trismus neonatorum*), and the mortality from this source among the negroes of some of the West India islands destroys almost one-half of their entire infant population. It is very probable that the raw umbilical surface is the seat of the specific infection. Aside from the tetanus of the new-born, the affection is most frequently seen from the tenth to the thirtieth year, and oftener in males than in females, owing to the greater liability on part of boys and

men to injuries and to exposure. Idiopathic tetanus results from exposure, such as sleeping on damp ground, and is of rare occurrence in man.

The bacillus of tetanus was discovered in the soil by Nicholaiier in 1885, in man by Rosenbach, in 1886. It forms a slender, delicate rod which swells on one end, presenting an oval, sharply defined, shining spore, thus resembling a drumstick or pin. The bacilli occur in regular masses in the affected tissues, are easily colored with methyl blue and fuchsin, and are not readily cultured. Brieger (1887) separated from the culture, and from a subject dead of tetanus, various toxins, of which one, tetanin, causes the characteristic symptoms of tetanus, with fatal termination.

The disease may be transmitted to animals by inoculation with the culture, and protection may be insured by inoculation with the blood of an animal which has had the disease.

The bacillus is motile, grows at an ordinary temperature, and is anaërobic, that is, capable of existing only in a medium destitute of free oxygen. It is widely disseminated in the soil, both inhabited and virgin, especially in the dust, dirt, and rubbish about houses. "The wide dissemination of the parasite accounts for the cases of apparent spontaneous or idiopathic tetanus, while the fact that the free access of oxygen prevents its growth furnishes explanation of the comparative rarity of the disease and the greater liability of penetrating wounds." (Whittaker.)

Morbid Anatomy.—No characteristic changes have been observed in either brain or cord. A slight degree of congestion, with granular changes in the nerve cells, is frequent. The wound itself commonly presents evidence of slight inflammatory action.

Symptoms —The symptoms of tetanus usually occur within ten days, rarely more than fifteen days, after the injury. They consist of violent spasms, which begin mildly, increase gradually, and progress from above downward. Occasionally malaise, shivering, pain in the epigastric region and at the seat of injury constitute a sort of prodroma; but much oftener the first symptom of which the patient complains is a stiffness about the neck, with feeling of tightness about the jaw, rapidly developing into tonic spasms of the muscles of mastication,

and constituting *trismus* or *lockjaw*. The muscles of the face soon become involved; the lips are stretched over the locked teeth, and the eye-brows are raised, producing *risus sardonicus*, the appearance of the face becoming grotesque and much aged. With this state there is usually much difficulty of swallowing. The case progressing, the muscles of the trunk yield next, the body assuming various well-marked fixed positions. The entire body may lie rigid, like a statue (*orthotonos*); or it may be arched, with its convexity upward, so much so, at times, that only the back of the head and the heels touch the couch (*opisthotonos*), the abdominal muscles sometimes actually being torn in two from the terrible strain put upon them; or the body, more rarely, is violently flexed to one side (*pleurosthotonos*) or bent forward by spasm of the abdominal muscles (*emprosthotonos*).

Convulsive attacks with lightning-like shocks sometimes take place during these tonic spasms, and patients occasionally complain of shocks like those caused by a strong electric current at various stages of the disease, especially before the occurrence of violent spasms. The extremities, especially the arms and hands, become involved late.

The suffering of the patient is extreme; perfect relaxation and rest of the weary muscles does not occur during the intervals, and the most trivial cause, as a slight voluntary effort, a touch, even a suggestion brings on a new spasm. The chest becomes compressed from spasms of the thoracic muscles, rendering respiration rapid and labored, often with severe lancinating pain in the lower chest from involvement of the diaphragm; asphyxia is threatened from spasm of the glottis; neither drink nor food can be taken save under most distressing conditions, and may have to be administered per rectum; speech, also, is impossible, and the patient, entirely conscious throughout, lies in indescribable agony, unable to obtain a moment's perfect relief from intense suffering, usually bathed in profuse sweat, with stubbornly constipated bowels, and urine retained or suppressed.

The temperature varies. It may be normal throughout, with a slight rise before each aggravation of the spasms and a more marked elevation toward the termination of the case; or it may be quite high from the beginning, especially so in cases where

there has been a distinct rigor on the start, reaching 105°, or more, with an elevation before death to 109° or 110°, and even higher. Death results during a spasm from asphyxia or heart failure, or from sheer exhaustion.

Diagnosis.—The most important symptoms for diagnostic purposes are: The history of an injury, the early appearance of trismus, and the absence of periods of freedom from suffering. Of these, the early appearance of trismus is the most valuable. "The feel of the rigid masseters inside the mouth, and the associate stiffness at the back of the neck, speedily dissipate doubts." *Hysteria* may resemble tetanus, but only vaguely; the history of the hysterical case, the irregularity and fitfulness of the hysterical convulsions, and the periods of rest which are bound to occur, will establish the diagnosis. The various affections of the *brain* which resemble tetanus very rarely, if ever, have trismus. *Hydrophobia* has a much longer period of incubation, lacks trismus and opisthotonos, and presents a characteristic psychological picture essentially its own. *Poisoning with strychnia* presents a striking resemblance to tetanus, but there is lacking the history of an injury; its symptoms appear almost immediately after the poison has been taken; there are severe gastric symptoms; the muscles of the extremities are attacked at once, in tetanus these become affected late; it does not cause trismus as an *early* and characteristic symptom, and it has distinct periods of rest between the spasms.

The prognosis is very serious; an estimate of a mortality of not less than eighty per cent. in traumatic tetanus and of about fifty per cent. in the idiopathic form is generally accepted as correct. Hippocrates gives a favorable prognosis in cases that have safely passed four days, and experience has demonstrated that he was correct. The mortality is greatest among children. Late onset of the disease, absence of fever, and limitation of the spasms to the muscles of the neck and jaw make the prognosis less grave. Improvement shows itself by a lessening in the frequency and severity of the spasms and increasing tendency to rest during the intervals.

Treatment.—Prophylaxis consists of great care of such injuries as may cause tetanus, especially in the removal of earth or dirt which may adhere and in the employment of strict antisepsis. Excision of injured parts or amputation is still advised

as a means of lessening the danger of autoinfection, but has ceased to be generally recommended; in fact, it is admitted that amputation has been the direct cause of death by further exciting tetanic spasms. The serum treatment of Tizzoni and Centanni, and of Roux, is now the subject of extensive study, but the results obtained are not yet conclusive.

Absolute rest in a dark room, under the care of one well-trained attendant who will move about noiselessly and prevent anything likely to excite reflex action, is of the greatest possible importance; it is even urged that the ears of the patient be stopped up with cotton. As soon as swallowing becomes difficult, liquid food should be given exclusively, and feeding per rectum must be diligently maintained as soon as deglutition has become impossible. The use of chloroform during the spasm has been earnestly advocated, but excellent authorities not only deny the wisdom of this practice, but insist upon its being harmful, preferring that the patient be kept under the influence of full doses of morphia hypodermically administered.

CHLORAL, CALABAR BEAN, CANNABIS INDICA, CURARE, STRYCHNIA and BELLADONNA are the chief remedies used by the profession at large; the inefficiency of this treatment is generally admitted and attaches especial interest to the experiments made with the serum or antitoxin.

NUX VOMICA (STRYCHNIA, IGNATIA), by the striking similarity of its pathogenesis to the symptoms of tetanus, the violence of its convulsions, tonic rigidity of the muscles, intensely stimulated reflex action, difficult respiration and threatening asphyxia from involvement of the muscles of the throat and chest, constipation, retention of urine, electric shocks from the brain to different parts of the body, and many others, has always been considered our most promising remedy. In the hands of physicians of the dominant school strychnia, given in doses as large as one-sixteenth of a grain every two hours, has been successfully used, although it is not at present strongly recommended by their highest authorities. In the practice of homœopathic physicians, low dilutions of NUX have been useful. The higher attenuations also have yielded good results. Thus, Conant (*N. E. M. Gaz.*, 1874) reports a cure with the 30th att., and J. M. Selfridge (*Pac. Coast Journ. Hom.*, June, 1895) a cure with the 200th; both cases, however, were "incipient"

rather than fully developed.—*GELSEMIUM* was first recommended by E. M. Hale. J. Martin Kershaw (Arndt's System of Medicine) advises its use when there is "stiffness of the jaws; pain and stiffness in the back of the neck; spasmodic sensation in the pharynx and œsophagus, with difficulty of swallowing; constrictive pain about the chest, with difficulty of breathing; dilatation of the pupils; cramps in the legs; involuntary discharge of fæces and urine; convulsive action of the voluntary muscles." Kershaw reports a case cured by teaspoonful doses every hour of a solution of fifteen drops of the mother tincture in half a glass of water.—*ANGUSTURA VERA* in many respects resembles *NUX VOMICA*, and in its pathogenesis has symptoms which are exceedingly suggestive of tetanus, including trismus, opisthotonos, stiffness in the neck and between the shoulder blades, jerking like electric shocks, tetanic spasms, caused by contact, drinking, etc. Hubbard (Med. Invest., Vol. 7) reports a cure of traumatic tetanus, in the early stage, from pins run into the foot, by the use of the 3d att., every half hour. B. L. B. Bayliß reports two cures made with the 200th att.—*CICUTA* is indicated in tetanic convulsions with rigidity of the entire body, marked opisthotonos, great embarrassment of respiration, spasms brought on by the slightest jar, sudden rigidity, followed by jerkings and violent contortions, and utter prostration. Dr. Beckwith reports a case cured by *CICUTA* 3d att.—*HYPERICUM* is held in high regard in cases of nerve-traumatism, where there is excessive soreness and painfulness of the injured parts; it has been prescribed in tetanus resulting from penetrating wounds made by pointed instruments. In the case reported by W. F. Hocking, resulting from a dozen pins penetrating the sole of the right bare foot, pain ran up the right limb through the spine to the neck and face. The muscles of the neck and jaw became very rigid, mostly on the right side; also those of the thorax and abdomen.—*LACHESIS*. Cures have been reported by J. Heber Smith (rigors, shooting pains in the back, opisthotonos, then trismus; remission from midnight until noon; after midnight, profuse sweat and agitated sleep; throat sensitive to contact, swallowing painful) and by M. L. Sircar (Hom. World).—*PHYSOSTIGMA* acts powerfully upon the spinal cord, producing tetanic spasms. "Paralysis preceded by twitching or trembling of the muscles; dilatation of the pupils;

syncope or tendency to fainting; trembling, convulsive action of the respiratory muscles, alternate dilatation and contraction of the pupils, the former corresponding with the period of spasm, and the latter with the period of quiescence." Wm. T. Helmuth reports a case cured with this remedy, a dose every two to three hours of a solution of ten drops of the tincture in a half a glass of water. "The spasms of the muscles of the jaw were so violent that a breath of air caused by a person passing would induce them."—HYDROCYANIC ACID is recommended by Hughes where there is cyanotic appearance, coldness; the heart beats slower and slower, until it almost ceases, then suddenly rises in frequency with each return of the paroxysm. There is violent constriction of the diaphragm, with great difficulty of breathing. The spasms come on with lightning-like quickness. Opisthotonos.

Among other remedies, likely to prove useful, mention should be made of BELLADONNA, PASSIFLORA (used in teaspoonful doses of a fresh infusion or, if that cannot be obtained, of a fresh non-alcoholic tincture), RHUS TOXICODENDRON (from getting wet?), CURARE, ACONITE, CANNABIS INDICA, HYOSCYAMUS and STRAMONIUM.

It is probable that the most reliable remedies, homœopathically, are NUX, STRYCHNIA, IGNATIA, ANGUSTURA, PHYSOSTIGMA and GELSEMIUM.

I would also suggest the use per rectum of an infusion of leaf-tobacco, thoroughly steeped. Tobacco acts powerfully upon the nervous system, possesses wonderful relaxing properties, and, as an injection, has been successfully used in the treatment of lockjaw by hunters and woodmen in Northern Europe.

LEPROSY.

Leprosy, lepra Arabum, elephantiasis Græcorum, is a chronic infectious disease, due to infection with the bacillus lepræ. It is characterized by the presence of dark, brownish or reddish patches upon the skin or of flat diffuse nodules in the skin and mucous membrane, which undergo desquamation and ulceration, and associated with a peripheral neuritis with hyperæsthesia, anæsthesia and trophic changes.

Leprosy occurs endemically in nearly all parts of the world, seemingly independent of local conditions. In this country it is chiefly found in Mexico and in the Gulf states, on the Pacific coast, principally among the Chinese, in the Northwestern States among immigrants from Iceland and Norway. It is quite common in the West Indies, on the Sandwich Islands, and in India. The disease was first carefully studied by Boeck, of Christiana.

The ætiology is not clear. A certain hereditary predisposition seems to exist in many instances, but persons whose ancestry have at no time shown a trace of the affection have acquired leprosy. The presence, invariably, of the bacillus lepræ has been clearly demonstrated (Hansen and Neiser). It is rod-shaped, in length equal to one-third or one-half the diameter of a red blood globule, occurs in short rows or bundles, chiefly in the cells, also in the lymph spaces. Just how infection takes place is not understood, neither has the question of the possible contagiousness of leprosy been settled. Persons have for years held the closest possible relations to lepers without contracting the disease, as the relation of husband and wife or nurse and patient. Prof. Baetz, of Tokio, Japan, is authority for the statement that the people there, especially the peasants, sleep together, naked, under one cover, and that no case of contagion has been observed in spite of the fact that many of them are lepers suffering from ulceration. Arning performed inoculation successfully in a Hawaiian convict, but the assumption that leprosy may be transmitted by vaccination is rendered doubtful by experiences had in Japan. It has been suggested that in a majority of cases the disease, like syphilis, is transmitted by sexual intercourse; observation, especially on the Hawaiian Islands, gives some color to this presumption.

Morbid Anatomy.—The lepra nodule or tubercle consists of granulation tissue (Virchow), the characteristic leprosy cell being larger than that of lupus, and more persistent; it runs a very slow course, finally undergoing absorption or degeneration. The new tissue is situated in the corium, at varying depth, and by extension into the connective tissue gives rise to leprous cellular infiltration. Thus nodular growths appear in the skin, with surrounding areas of ulceration and cicatrization; the mucous membrane (conjunctiva, cornea, larynx) may

also be invaded. A peripheral neuritis is a frequent feature, with infiltration of cells, usually leading to fatty degeneration or atrophy of the primitive nerve fibres. This explains the existence of various sensory derangements and their occasional unexpected disappearance, the result of absorption of the inflammatory products; also the irregular anatomical distribution of the affected regions. In quite recent investigations, according to Kaposi, "focal cellular infiltrations of the connective tissue framework, with secondary atrophy of the parenchymatous tissue, have been found in the lungs, intestines, testicles, liver, spleen, and kidneys."

Clinical Forms.—The forms usually described are the *nodular* or *tubercular* and the *anæsthetic*. Each possesses distinctive features, but nearly all advanced cases present all the types mixed. The so-called *macular* leprosy consists of patches, dark-red or brownish in color, with or without infiltration, or spots of dark pigmentation, intermingled with non-pigmented spots, giving the subject a blotched, dappled appearance; or the pigmentation may disappear, leaving the skin snowy white. This form almost always passes into the nodular form.

Nodular leprosy begins with the appearance of irregularly scattered dusky patches, i. e., maculæ, sometimes infiltrated, and usually sore to touch, which may continue for several months or years before the nodular growths show themselves. These growths, when they appear, are of dusky color, firmly elastic to the touch, from the size of a pea to that of a hazel-nut, widely and irregularly scattered or forming plaques. Usually they are most numerous on the face, forming heavy ridges above the eye-brows, thickening the lips, disfiguring the lobes of the ear, and giving to the face a low, coarse, stupid expression. The epidermis covering the nodules often desquamates. The accompanying infiltration on other parts causes inconvenience and even suffering. Papules may be found upon the conjunctiva and cornea, and may eventually lead to blindness. The nodules run a slow course. Some gradually disappear by absorption, others break down, forming flat, irregular ulcers, which may involve deep tissues and then result in the destruction of bones, loss of metatarsals, phalanges, and of entire joints. Involvement of the mucous membrane of the mouth and throat results in thickening and fissuring of the tongue, partial

destruction of the epiglottis, harshness of the voice and aphonia, with occasionally serious and even fatal complications.

Loss of hair on the face, sickening sweetish odor from the mouth, anæsthesia of different parts of the body, and sometimes fever, occur in the course of the disease, as well as such complications (erysipelas or lymphangitis) as may arise from extensive ulcerations and cachexia. In aggravated cases, running an exceptionally acute course, cerebral symptoms, diarrhœa, pneumonia or pleurisy may be present, with tendency to an early fatal termination. If the disease runs the usual chronic course, death takes place in from eight to ten years from marasmus or from some complication of the kidneys, lung or pleura.

Anæsthetic Leprosy.—The characteristic feature of this form is anæsthesia, commonly preceded by redness of the parts and hyperæsthesia. It may occur in parts which are wholly normal in appearance, or at the site of maculæ or nodular growths, or in parts which have been the seat of pemphigus, an affection which on resolution leaves white shining anæsthetic spots or is followed by ulceration. The anæsthesia, though not usually affecting the deep parts, is complete, so that a burn or other injury may be inflicted without being felt by the person hurt. The writer is familiar with a case in which the existence of leprosy was first betrayed by the absence of pain from a severe burn on the fingers caused by removing a very hot chimney from a lighted lamp. Atrophy of the skin and deeper tissues develops after a time. The skin becomes wrinkled, flabby; the eyelids droop; the lower lip becomes pendulous, and there is constant escape of saliva from the mouth; deformities of the face, limbs, and especially of the hands, result from the partial and irregularly distributed paralysis of muscles or groups of muscles; the fingers assume a club-like shape, with "cap-shaped" nails; the hands turn inward at the wrist, and leprous baldness (*lepra alopecia*) sets in. More pronounced structural changes occur, trophic in character, as ulceration, sudden loss of small members, fingers and toes, or of hand or foot, i. e., *lepra mutilans*. Simultaneously a gradual lowering of the bodily temperature takes place, the patient becomes dull, apathetic, childish, and death from complications (pneumonia, albuminuria, diarrhœa, pyæmia, sometimes tetanus) closes the scene after a period of from fifteen to eighteen years.

As already stated, the macular form almost invariably after a time becomes nodular, and anæsthesia, with the ulcerative lesions described, is a part of the nodular or tubercular form, so that a case in the late stage of the disease presents the symptoms of all the types. In addition, complications very often occur, such as scabies, flavus, general eczema, elephantiasis Arabum, etc.

The diagnosis, if the disease is at all advanced, presents no difficulty. In the early stage a mistake may be made, especially as to the possibility of syphilis, but the lack of success under specific treatment and knowledge of former residence in a country where leprosy is endemic, will settle the diagnosis.

The prognosis is wholly unfavorable.

Treatment.—There is no proof that any measures yet proposed are of the slightest value, save in so far as proper hygiene, an out-of-door life, and due attention, usually surgical, to arising complications will prolong life and render it more comfortable. Chaulmogra oil, in two-drachm doses, and Gurjun oil, in five- to ten-minim doses, are recommended by Osler, without comment. Carreau gave from 150 to 300 grains daily, for three consecutive days, of chlorate of potash, producing "grave symptoms of poisoning, but after the disappearance of these symptoms the leprosy tubercles almost wholly disappeared, leaving the skin soft and wrinkled."

ARSENICUM ALBUM, ARSENICUM IODATUM, IODINE and PHOSPHORUS, possibly LACHESIS and PSORINUM, should receive a thorough trial.

GLANDERS.

Glanders or farcy is an infectious disease of horses, nearly always fatal, which may be communicated from horse to man, at times from man to man. It is characterized by granulomatous formations in the nares (glanders) or beneath the skin (farcy), and caused by the presence of the bacillus mallei (Lœffler, Schuetz, 1882), an immobile bacillus, in appearance resembling the tubercle bacillus, but shorter and readily colored with alkaline aniline dyes.

Infection occurs chiefly among persons brought into close contact with horses; hence the disease is oftenest seen among veterinary surgeons, coachmen, and stock farmers. It results from direct contact with the poison and from inoculation on abraded surfaces. Owing to the volatile character of the poison, sleeping in a barn occupied by an infected animal is dangerous. Occasionally the poisonous discharges of a glandered horse are deposited upon the respiratory mucous membrane of a person riding behind it, by sneezing, snorting or coughing on part of the animal.

The period of incubation varies from three to five days; exceptionally it covers several weeks. The symptoms are those of local or general infection. Local infection is characterized by inflammation, lymphangitis and suppurative processes, often metastatic, terminating favorably by sloughing off, fatally by pyæmia. General infection, in the majority of cases secondary to local infection, is shown by symptoms of blood-poisoning, including the formation of pustules, furuncles and abscesses, and frequently involvement of the nasal mucous membrane, with fatal termination in a few days, or assuming a chronic form, with recovery in exceptional cases, but more often death from marasmus.

The term glanders is applied to that form of the disease in which the nasal mucous membrane is severely affected. It begins with moderate fever, redness, swelling and lymphangitis at the seat of the infection. In a short time there is redness and great swelling of the nose, almost erysipelatous; nodules form, which are accompanied with ulceration and muco-purulent discharges, with a tendency, in many cases, to necrosis. Nodules also appear on the face and about the joints; these at first are hard and red, then soften in the centre, and discharge thick, fetid pus, the eruption closely resembling that of small-pox. These nodules form large suppurating tumors, resulting in extensive and deep ulcerations. The lymphatics, especially about the neck, are enlarged, and there is in many cases a tendency to subacute pneumonia. The acute form is fatal within four to fourteen days. When the disease runs a chronic course, it is not always easily recognized; it frequently resembles coryza; recovery takes place in exceptional cases only.

By the term "farcy" is meant that form in which the infection

is manifested chiefly upon the skin, there giving rise to intense phlegmonous inflammation. The lymphatic glands are affected early, vague rheumatic pains are felt, and large nodular enlargements, i. e., farcy-buds, form. These soften, constituting extensive abscesses and giving rise to deep ulceration. Quite often the muscles become the seat of deep abscesses. In this form the nose is rarely, if ever, affected, neither are there any superficial skin symptoms. The general drift of the constitutional symptoms is that of a violent acute infection with rapidly developing blood-poisoning. These symptoms may appear in a less violent form, running a chronic course, without extensive involvement of the lymphatics. In the acute type death results in from ten to twenty days. The course of the chronic form is indefinite; recovery may take place, but oftener an intercurrent attack of acute glanders, or finally marasmus, brings the case to a fatal issue.

Examination after death shows the existence of numerous centres of purulent inflammation in the skin, nasal mucous membrane, pharynx, larynx, bronchi and pulmonary tissue, and alterations of the deeper organs, muscles and vascular system.

The diagnosis rests upon the occupation of the patient, the character of the nasal discharges, of the eruption of the skin (farcy-buds), and the presence of the bacillus mallei. The action of mercurials and of the iodide of potassium, with the history of the case, will determine whether the case is one of *syphilis* or glanders. *Tuberculosis* does not especially affect the nose and skin, while it does by preference affect the lung and the organs of speech. The eruption of *variola* is much more uniform than that of glanders, does not appear in successive crops, and has not the deep and extensive ulceration of glanders.

The prognosis is exceedingly unfavorable in acute cases; it is serious in chronic cases, but recoveries are made, although usually these are not perfect.

Treatment.—Prophylaxis includes the prompt killing of all infected animals, proper care of the carcass by deep burial or cremation, and the destruction of everything about the stable which has been exposed to the infection, as litter and fodder, with thorough disinfection of stall and barn, and their contents. It is evident that extreme care is necessary in handling a diseased animal.

Hell, and others, claim to have had good results from the injection of sterilized blood serum of horses which had just passed through an attack of glanders, and they have used this treatment for prophylaxis and cure of the disease.

Infection having taken place, surgical measures must be promptly employed, as the actual cautery or strong carbolic acid at the seat of the infection, or excision of the infected parts. Vigorous antiseptic treatment must be maintained at any point presenting evidence of local infection. "Farcy buds" are to be opened early and freely, and the strength of the patient must be kept up by nutritious diet, including the use of stimulants when indicated by the general condition.

Mallein has been the subject of extensive experimentation by Foth, Schuetz, Hutyra and Preiz, Bonome, and others. Chenot and Picq (1892) claim "to have cured glanders in guinea pigs by injections of blood serum from the ox. Guinea pigs treated with ox-serum, either before or after infection, recovered in seven cases out of ten. When inoculated with very violent cultures, which usually killed these animals in five days, the animals are said to have survived from twenty-one to forty-two days." "Bonome reports that he has had favorable results in the treatment of chronic glanders in man by doses of $\frac{1}{15}$ to $\frac{1}{20}$ C. C. The first dose is said to have caused an elevation of temperature, headache, polyuria, etc., but upon repeating the dose after two or three days a decided improvement of the general symptoms followed" (Sternberg: Immunity and Serum Therapy).

KALI BICHROMICUM has been urged by Hughes as thoroughly homœopathic to glanders, and a careful study of its symptoms, of the respiratory organs and of the skin, substantiates the claim. Moore, an English veterinary surgeon, has used the remedy successfully.—MERCURIUS CORROSIVUS is suggested by the violence of existing symptoms, and deserves a careful trial.—ARSENICUM, also, should be useful in many cases.—GRAPHITES should be of value in the chronic form; E. C. Price has used it successfully in horses.—LACHESIS and CROTALUS have symptoms which may render them curative in glanders, but the insufficiency of clinical data makes it impossible at present to form reliable conclusions.

ACTINOMYCOSIS.

An infectious disease of cattle, rarely of man, caused by the presence of actinomyces or ray-fungus, which sets up a chronic inflammation, with liability to metastasis to different organs, and symptoms of pyæmia and marasmus.

The parasite (Israel, 1877; Ponfick, 1879,) is found in the pus which is discharged from the affected parts, and often occurs in masses large enough to be seen with the naked eye. The latter "consists of a conglomeration of innumerable threads of mycelia about a central mass of the same structure, from which the threads radiate in every direction to construct the ray shape. The mycelia can always be recognized by their clubbed extremities, and the mass, on an average about one-fortieth of an inch, is as large at times as one-tenth of an inch in diameter." (Whittaker.)

In animals the affection constitutes a granulation tumor, and is practically a local disease; in man it sets up suppurative processes, with tendency to metastasis and symptoms of severe constitutional involvement. The parasite usually finds entrance through the food taken (vegetables, especially barley); it readily lodges in the cavities of decaying teeth or upon abraded surfaces in the mouth or throat, and sometimes enters the bronchial tubes. A small granulation tumor is formed, soon followed by remarkable proliferation of the surrounding connective tissue, and eventually by suppurative processes. The constitutional symptoms which accompany the disease are: fever of an irregular type, considerable prostration, cough, and sepsis.

Distinct forms are described, affecting the alimentary canal, the lungs, the skin, and the brain. In the *alimentary canal* the affection may be primary or secondary. Whitish patches are observed on the intestinal mucous membrane, covered with yellowish granulations and firmly adhering to the membrane upon which they rest. Swelling and subsequent suppuration with, often, discharge of contents into the peritoneal sac, frequently result; fragments are occasionally carried to the

liver, setting up similar processes there. At times there is agglutination to the surface of the abdomen, with subsequent free discharge. The jaws are occasionally involved in man, the enlargement being great and resembling sarcoma; in several cases small growths have been found in the tongue. *Pulmonary* actinomycosis occurs as a bronchitis, closely resembling fetid bronchitis; the expectoration of actinomycosis separates into two layers, the lower and turbid layer containing the parasite. The symptoms may resemble those of tuberculosis, with cough, loss of flesh and strength, hectic fever and night-sweats. If the case progresses rapidly, a broncho-pneumonia may be present, with characteristic expectoration, dullness on percussion, bronchial breathing, and formation of abscesses and cavities. Metastasis occurs here to the liver, kidneys, intestines, heart or brain, or subcutaneous abscesses may form, or there may be necrosis of bony structure, as of the sternum or vertebræ. On the *skin* the affection is seen chiefly on the cheek, angle of the lower jaw, abdomen and groin; diffuse, tense infiltrations appear, which involve the subcutaneous cellular tissue, forming small suppurating growths and abscesses with sinuous canals. This form is intensely chronic. *Cerebral* actinomycosis is exceedingly rare, Bollinger having reported only one case in which the affection seemed to be primary; symptoms of cerebral tumor were present.

Diagnosis.—The disease so closely resembles chronic *pyæmia* that a differential diagnosis is extremely difficult. In actinomycosis, however, the trouble is more of a local character, with pronounced tendency to destruction of tissue. As compared with *tuberculosis*, its preference for the lateral and posterior portions of the lungs, rather than the apices, is an important consideration. In the *intestinal* form it is often possible to detect by the “feel” nodular masses beneath the surface. The microscope alone can firmly establish the diagnosis.

Treatment.—The treatment is surgical. Abscesses must be opened, the parts thoroughly irrigated, and all diseased tissue removed. Destruction of the diseased tissue with the solid stick of nitrate of silver has been practiced. Billroth has used tuberculin successfully. “Gautier reports the cure of a case by the electro-chemical treatment, i. e., by the hypodermatic injection of a ten-per-cent. solution of potassium iodide into the dead

tissue, followed by the insertion of needle electrodes through which was passed a current of fifty milliampères for twenty minutes." Oestertag calls attention to the value of iodine, as first advised by Thomassen, in 1885. The tumors are first cross-cut, and then treated with the tincture of iodine, while potassium iodide is exhibited internally. In cattle this treatment has proved of genuine merit and is even pronounced specific by eminent authorities. In man, however, the disease assumes a more serious and diversified aspect and evidently requires different methods of treatment. Clinical experience so far is limited and not conclusive. The most promising remedies are TUBERCULINUM, ARSENICUM ALBUM, ARSENICUM IODATUM, SILICA, PHOSPHORUS and IODINE.

FEBRICULA.

A fever of slight duration, not associated with any definite lesion or infection, running a rapid course toward a favorable termination. The term "ephemeral fever" is applied to a case of not more than twenty-four hours' duration; if the fever persists longer, it is a "febricula."

Ætiology.—The causes cannot always be recognized. In fact, febricula, Weil's disease, Milk sickness, Malta fever, Mountain fever and Miliary fever are by recent writers, as a matter of expediency, classed as "infectious diseases of doubtful origin." The more common causes of febricula are abortive cases of probable infection occurring during epidemics of typhoid fever, scarlatina, measles, and other infectious diseases; slight gastric or gastro-intestinal disorders, frequently accompanied with nausea, vomiting or diarrhœa; intestinal irritation from the presence of parasites in the alimentary canal; abortive tonsillitis or pneumonia; mental excitement; transient, but severe, exposure to cold, heat, or fatigue; exposure to foul odors in persons very susceptible to them or to sewer gas; inflammatory conditions so slight as to be recognized with difficulty.

Symptoms.—The onset may be abrupt, or there may be premonitory symptoms, as general indisposition, headache, nausea and vomiting. The fever usually develops rapidly, reach-

ing a temperature of 101° to 103°, or more, and there are noted the common signs of pyrexia, i. e., flushed face, rapid pulse, thirst, scanty and high-colored urine, fever-blisters on the lips, and a degree of nervous excitement which depends chiefly upon the age and temperament of the patient. In children it is by no means uncommon to find very great restlessness, symptoms of cerebral excitement and delirium, especially at night. In many cases bronchial irritation with cough is also present.

The attack usually terminates by crisis in a few days; occasionally, however, a much longer period, sometimes weeks, passes before recovery takes place. If the latter is the case, remissions often occur, and a condition may develop which suggests the possibility of malarious infection.

Diagnosis.—The diagnosis cannot be made at the beginning of the attack; in fact, it depends entirely upon negative evidence, as the *absence* of inflammatory action and of infection. Sudden and complete termination of the case confirms the diagnosis.

Treatment consists of rest in bed, a light diet, an abundance of cool, fresh water, and attention to the stomach and bowels.

ACONITE. High fever; dry heat; quick, firm pulse; great restlessness, with energetic tumbling about in bed; great thirst; from cold, mental excitement or fright.—GELSEMIUM. Quick but soft and large pulse; face flushed, bright-red; hot, moist skin; dull headache, with dizziness; remissions.—BRYONIA. Fairly high fever; soreness all over; rheumatic pains, worse from moving about; bronchial irritation, with dry cough and soreness in the chest; tongue coated whitish-yellow; bitter, nauseating taste in the mouth; pain in the chest and epigastrium; dull, stupefying headache.—BELLADONNA. Severe headache; heat in the head; the face and eyes are congested; pulse rapid and full; cerebral excitement; nightly and characteristic delirium; tendency to convulsions; sore throat.—BAPTISIA. Pulse rapid, full, soft; great thirst; tongue coated yellowish-white or brownish; bitter taste in the mouth; sweating; symptoms pointing toward gastric fever.—CINA. High fever and thirst; jerking and twitching; foul breath; urine dark, high-colored; worms.—RHUS, ARSENIC, EUPATOR. PERFOL. (“bilious” fever, malarial symptoms), IPECACUANHA, MERCURY, and possibly VERATRUM VIRIDE, may also be indicated.

WEIL'S DISEASE.

Under this name are grouped by common consent a set of symptoms first described by Weil, in 1886, of which jaundice, enlarged spleen and nephritis are the most prominent; the term "acute infectious jaundice" is also used.

The cases described have usually occurred among men, from the twenty-fifth to the fortieth year, in the summer months, and seem to have resulted from exposure to the action of some decaying substance. In the majority of cases the termination was favorable.

Freyham reports the following as a typical case: "A man, aged thirty-two years, was suddenly seized with shivering, fever, headache, followed by semi-coma. On the next day jaundice was noticed. On admission, the tongue was dry and coated, the temperature 38.9° C., and the pulse 100. The urine was dark in color, contained bile pigment and a trace of albumin, some hyaline casts, and a few red and white cells. The liver and spleen were both enlarged. The stools were loose and passed unconsciously. The fever terminated by lysis in a few days, the other symptoms disappearing at the same time. Severe pains in the calves were noticed, especially at this time." The jaundice usually occurs early, with enlargement and tenderness of the liver, pale, colorless stools, enlargement of the spleen, and generally fall of both temperature and pulse. The temperature rarely rises above 105°, and begins to drop after the fifth or eighth day, reaching normal from the tenth to the twelfth day. Eruptions of the skin—erythematous, roseolar, or herpetic—sometimes with itching, frequently appear about the seventh day; there may be bronchial irritation, with cough, sore throat and epistaxis.

In some cases, about one-fourth, a slight relapse takes place within a week after the return to a normal temperature, but it rarely lasts more than four or five days. Convalescence is slow and covers a period of many weeks.

The prognosis is favorable.

Jaeger, of Stuttgart, Germany, studied ten cases of Weil's

disease, of which three died. The latter, after death, presented "jaundice, fatty degeneration of the liver, with interstitial small-celled infiltration; acute parenchymatous nephritis, with fatty degeneration and cellular infiltration; hæmorrhages into various organs; and enlargement of the spleen." Of these ten patients, seven gave a history of having bathed in a river which was found to be defiled; it was proved that in a village bordering on a tributary stream an epidemic disease prevailed among the fowl. Two of the patients had eaten food suspected of having been contaminated. One patient, the only woman in the series, thought she had "taken cold." Jaeger succeeded in isolating from the urine of most of the cases during life, and from the tissues of two of the fatal cases, an organism which, when inoculated upon lower animals, caused lesions analogous to those found in man, and from these again the same organism could be isolated. Examination of the fowls above referred to "revealed the existence of lesions similar to those encountered in cases of Weil's disease, together with the presence of organisms found in the cases in man, and which again, by inoculation, could be transmitted to other animals, producing in turn characteristic lesions." This organism is described as a short rod, resembling the coccus, slightly curved, motile, without spores. "It grows in various culture media, to which it usually imparts a greenish fluorescence, sometimes causing liquefaction, at others not. It can be stained by first treating it with Kuehne's methylene blue, then briefly with dilute hydrochloric acid, and finally with aniline oil." To this organism Jaeger applies the name "bacillus proteus fluorescens."

The treatment is purely symptomatic.

MOUNTAIN FEVER.

The terms "mountain fever" and "mountain sickness" are used to cover groups of symptoms which really have little, if anything, in common, save that they occur in high elevations. Commonly, reference is had to a continuous fever which undoubtedly is typhoid in character and tendency, and which after death presents the characteristic intestinal lesion of

typhoid. In others, as pointed out by Work, the symptoms are those of a simple continued fever, greatly varying in severity. Again, reference is had to those special symptoms which result from living at a high altitude, also from mountain-climbing, and here the term "mountain sickness" is especially applicable. These symptoms consist of headache, dizziness, nausea, rapid and irregular pulse, sense of choking and of fulness at the heart, embarrassment of respiration, and excessive bodily weariness. The former conditions find their remedy in rest, good nursing, and the use of *GELSEMIUM*, *BAPTISIA*, and similar remedies. The latter demands the exhibition of heart-stimulants, rest, and removal to a lower altitude.

SWEATING SICKNESS.

Sweating sickness or miliary fever is an acute disease of doubtful origin, occurring in epidemic form, characterized by fever, profuse sweating, and an eruption of miliary vesicles. The disease at one time was widely spread, but now seems confined to Italy and Picardy, France. The epidemics usually are of short duration, lasting from a fortnight to three or four weeks, and are remarkable for the swiftness with which they cover an invaded territory. Light cases present malaise, loss of appetite, headache, etc., followed by moderate fever, erythema, copious sweating, and an eruption of miliary vesicles. In severe cases there is high fever, great prostration, delirium, sometimes convulsions, and hæmorrhage.

During the middle ages sweating sickness assumed the proportions of a scourge, and its fatality was very great; more recent epidemics have proved comparatively light. The mortality is greatest during the earlier part of an epidemic.

MALTA FEVER.

A fever of doubtful origin and uncertain duration, with a tendency to relapse, affording a slight immunity from subsequent attacks, endemic, and at times epidemic, seen in the island of Malta, Naples, and other districts at the Mediterranean. It

seems to be "a link between enteric fever and the so-called malarial marsh-fever." It is also known as Neapolitan fever, Mediterranean fever, rock fever.

The British troops at Malta have at times suffered severely from it, but sanitary improvements have steadily lessened the frequency of epidemics, the severity of the symptoms, and the rate of mortality. It had been thought that infected food and drinking water might be ætiological factors, but special precautions which were taken to correct both had no appreciable effect.

For a long time the fever was considered of malarial origin, but failure to control the paroxysms with quinine has been deemed positive proof to the contrary. The observations of Bruce show that no characteristic typho-malarial lesions were present; infection of the spleen, with micrococci, was demonstrated by Bruce, Gipps, Hughes, and others. Enlargement of the mesenteric gland has been found by Italian observers.

Hughes (London Lancet) "found the disease characterized clinically by a peculiarly irregular temperature curve, consisting of intermittent waves of pyrexia of a distinctly remittent type, each wave lasting from one to three weeks, with generally an apyrexial interval of two or three days. In rarer cases the remissions may become so marked as to impart an almost intermittent character, but distinguishable clearly from the paroxysms of ague. This pyrexial condition is usually very chronic, lasting even six months or more, and is not markedly affected by quinine or arsenic. It is usually accompanied by obstinate constipation, progressive anæmia and debility, and is followed, in a large number of cases, by very chronic rheumatic and neuralgic complications, from which the patient may not recover for perhaps two years. The death-rate is very low, but the average stay in the hospital is from seventy to ninety days."

Wescott (British Medical Journal) says: "The onset of the disease may be insidious or sudden, with fever of remittent type, simulating that of enteric fever; but the temperature soon becomes irregular, and, generally toward the end of the second week, the concomitant constitutional symptoms commence to disappear, the tongue cleans, the appetite returns, the mental condition improves, and convalescence appears about to set in,

but the temperature remains high, and at any moment the patient is liable to suffer from a complication resembling rheumatic fever; the joints swell and become painful, and the constitutional symptoms of fever return, but the characteristic perspiration of rheumatic fever is absent, and there is evidently no relation to it. This complication, like every symptom of the disease, is of the most uncertain duration and degree; it may attack only one or two joints, and last only a day or two, or it may cause permanent joint disease. Local paralysis occurs frequently. The extensor muscles of the feet are those almost exclusively affected."

The *duration* of the disease is variable and the *mortality* light. Removal from an infected district does not materially lessen the severity of the attack or shorten the course of the fever.

Treatment.—Treatment consists of good nursing, careful feeding with easily digested, liquid food, and, in protracted cases with much prostration, the moderate use of stimulants. The remedies are those applicable to the treatment of continuous fevers with rheumatic complications.

MILK FEVER.

Milk sickness or milk fever is a presumably infectious disease of cattle, also affecting young horses and sheep, which may be communicated to man by eating the meat or drinking the milk of diseased animals or by using butter and cheese obtained from the same source. It is stated that the affection was frequent and very fatal when the country was first settled; now it is rare, but is still seen in North Carolina. The affected animal appears sick and exhausted, the eyes are injected, there is staggering and trembling after every muscular exertion (hence called "trembles"), and death occurs in convulsions.

Dr. J. Howell Way, of Waynesville, N. C. (Amer. Jour. of the Med. Sciences), describes the disease as it occurs in man as follows: "The onset is gradual and insidious; the patient becomes apathetic, and finds it impossible to arouse himself to his accustomed activity. Cephalalgia, anorexia, nausea, and marked

thirst represent the early history of the disease. The tongue, at first covered with a white fur, becomes, after a few days, large, heavy, and flabby, the breath assuming a sweetish foulness comparable to the breath of an unweaned calf. Vomiting occurs frequently, and is attended with very little immediate relief. The fluid expelled from the stomach most frequently has a slightly bluish color, and is not, as a rule, very abundant in quantity, many of the efforts at emesis being unattended with the ejection of any fluid whatever. The emesis ceases late in the course of fatal cases from sheer exhaustion, hiccough being then a frequent source of suffering. The abdomen is flaccid, and peristaltic action seems to be suspended, although diarrhœa is sometimes observed. Marked aortic pulsation may sometimes be felt through the abdominal parietes. The frequency of cardiac action is not increased, as a rule; in the earlier and middle periods of the disease it may be at times slowed, but in the profound prostration that ensues prior to death it is increased and labored, and the larger arteries seem to be unusually well filled. The temperature is generally subnormal, ranging from 97° to 98° F. In grave or fatal cases the sufferer sinks into a comatose condition."

The *duration* of the disease is variable; death may occur in two or three days, or the patient may linger for several weeks. No definite lesion has as yet been found.

PART II.

CONSTITUTIONAL DISEASES.

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RHEUMATIC FEVER.

Rheumatic fever or acute articular rheumatism is an acute febrile affection characterized by pain and inflammation of the fibrous tissue about the joints, with a tendency to involvement of the heart and other serious complications. Increasing susceptibility to the disease follows each attack.

Ætiology.—*Climate.*—Acute articular rheumatism occurs oftenest in temperate, humid climates, when the weather is changeable or damp and cold. Dry cold rarely develops rheumatic affections; the season of the year in which it is most frequent are the months of February, March and April, in this country. *Occupation.*—Persons whose occupation involves much exposure are particularly liable to articular rheumatism; hence sailors, bakers, laborers, foundrymen and hack-drivers often suffer from it. *Age.*—Sucklings and very young children are rarely affected; young adults, from twenty to forty years of age, according to statistics gathered in England, furnish 80 per cent. of the victims; according to Bell, nearly one-half of all the cases occur from the fifteenth to the twenty-fifth year. Liability grows less and less after the fortieth year has passed and almost ceases at fifty. *Sex.*—Among young persons, up to twenty years of age, girls suffer more than boys; after that age, men furnish by far the larger number of cases.

Among the *exciting* causes may be mentioned exposure, sudden chilling of the surface of the body, extraordinary fatigue, exertion involving especial strain upon joints already weakened

from previous attacks, or a fall, blow or injury in the neighborhood of joints. Habitual and free sweating is common with persons of a rheumatic tendency such as exists in some families.

The specific cause of the disease is in doubt. The so-called "metabolic" theory assumes that a morbid material is produced in the system, as the result of faulty assimilation. The "nervous" theory holds that the nerve centres are primarily affected by cold, and that the local symptoms are either trophic in character or due to the accumulation of lactic acid resulting from errors in metabolism depending upon disturbance in the nerve centres. Others maintain the existence of an infection or mycosis, and rest their belief upon the nature and course of the disease, its liability to occur in connection with scarlatina, puerperal fever, and other infectious diseases, and the almost specific action of salicylic acid, which is held to be a powerful antimycotic remedy. Failure to find a specific micro-organism in the blood or in the affected organs militates against this theory; furthermore, articular rheumatism is not transmitted from man to man, and the salicylic acid treatment often fails to accomplish what has been claimed for it.

Morbid Anatomy.—The affected joints are hyperæmic and infiltrated; there is swelling of the synovial membrane, with an increase of the synovial fluid, distending the articular cavity. This exudation may be normal, or acid, turbid, albuminous, containing leucocytes and even flakes of fibrin. Pus is rare in uncomplicated cases. The cartilages sometimes are slightly eroded. In tedious cases the periosteum of the articular surface and the marrow of the extremity of the bone show increased vascularity. These conditions develop and disappear quickly; involvement of the cartilaginous and bony structures has been observed later, and may persist long after the external signs of articular inflammation have ceased.

Symptoms.—The onset usually is sudden; at times the patient first complains of indisposition, irregular pains, sore throat, slight chilliness, and other symptoms of having taken cold. A sharp chill may set in, but usually there is merely a sense of coldness and shivering; in either case this is followed by fever and severe pain in one or more joints, the disease being practically established within two hours from the onset of the first symptom.

The *fever* presents no characteristic features. The temperature rarely rises above 102°; the pulse is rapid, soft, and commonly exceeds 100 beats per minute; the tongue is moist and covered with a white fur; anorexia, thirst, dark, high-colored, scanty urine, and other signs of pyrexia are present, with copious, sour sweat throughout the course of the disease.

The *joints* most frequently attacked are the medium-sized joints, as the knees, ankles, wrists and elbows, often the shoulders. They generally become involved successively. It is exceptional to find only one joint affected. Corresponding joints are frequently attacked. Inhibition of motion is the first expression of articular involvement, and not infrequently it is noticed before the external signs, redness and swelling, are observed. The *swelling* is due to serous infiltration of the peri-articular tissues and usually is moderate, although in the knee it may attain considerable size. When the ankles and wrists are the seat of the inflammation, the infiltration may be quite extensive, including the sheaths of the tendons and giving rise to marked enlargement of the hands and feet. If the case is very severe, the articulations of the jaws, ribs, and the various symphises may be involved, and in exceptionally violent attacks arthritis of all the large joints may be seen. The vertebral, sterno-clavicular and phalangeal articulations are much less liable to be affected here than in some other forms of rheumatic arthritis, as in the gonorrhœal form. The swelling is most pronounced in the joints which lie near the surface; there may be pitting of the skin over such joints, from subcutaneous œdema; swelling and redness may not be noticeable when the deep, large joints are the seat of the inflammation. *Heat* is almost always present, and can usually be detected by the touch of the hands. *Redness* varies from a slight flush to a pronounced deep red, sometimes uniform, again appearing in streaks or stripes. The *pain* is very severe, the slightest motion causing intense suffering. It is felt early, and gives rise to persistent attempts on part of the patient to place the affected limb in a position to avoid all tension; aggravations occur at night, from pressure, from motion. A peculiar feature of the local disease is the tendency to successive but irregular involvement of different joints, with recurrence of the affection in articulations which had seemingly recovered.

Profuse, acid *sweats*, later often neutral or alkaline, are constant and constitute a source of much discomfort. These are not in any sense beneficial or critical, but arise from profound nervous disturbance. Sudaminal and miliary vesicles are frequent, and are largely the result of irritation of the skin from the excessive sweating. The *temperature* in cases of moderate severity averages from 102° to 104°; it rises and falls as the local symptoms increase or lessen in intensity, and is somewhat kept in check by the copious sweating. When hyperpyrexia exists, the thermometer rises to 110°, or higher, and severe nervous symptoms are present. Recovery is attended with a gradual lowering of the temperature. The *pulse* rarely exceeds 100; if it reaches 120, complications usually exist. Murmurs at the apex of the *heart* are frequent and should be carefully watched. The *urine* is scanty, high-colored, acid, albuminous, and on cooling deposits urates; there is deficiency or absence of chlorides. The saliva frequently is acid in reaction. *Hæmorrhages* are occasionally seen; they generally depend upon pulmonary congestion or upon blood-changes; epistaxis is a frequent and unimportant symptom. The *blood* is altered rapidly, anæmia constituting a common and clinically important symptom.

The *mind* is clear, save when there is hyperpyrexia.

Nodules, of the size of a small shot or a pea, or larger, are often discovered under the scalp and on other parts of the body. They are not painful to the touch, and appear and disappear with remarkable rapidity. They exist also in the tendinous sheaths and on the periosteum, where they may be detected by palpation. It is stated that their presence may be regarded as a positive indication of rheumatism and that they are especially frequent in connection with chronic rheumatic endocarditis.

Subacute articular rheumatism is characterized by the same symptoms in a milder form, with involvement of fewer joints, much less pain, more moderate fever, and a temperature rarely exceeding 100°. The course is tedious, often lasting for many weeks, even months, with a tendency to become chronic. The disease is frequent in children; heart-complications are common.

Complications.—Rheumatic affections of the *heart* (endocar-

ditis, pericarditis and myocarditis) are frequent. They do not depend upon the severity or extent of the local affection or upon the anatomical relation of the affected joint to the heart. The frequency of their occurrence is variously estimated, some authors stating that they are seen in nearly fifty per cent. of all cases of rheumatic arthritis—undoubtedly a rather large estimate. Nevertheless, cardiac complications are common, especially in children and young people; they grow less frequent in persons more advanced in life. *Endocarditis* usually appears during the second week of the rheumatic attack, sometimes later, and commonly affects the mitral segment. It is verrucose, rarely ulcerative. Its chief danger lies in secondary structural changes, leading to valvular disease.

Pericarditis may occur in connection with, or independent of, endocarditis. Some authorities hold it to be the most common form of cardiac complications. It may be fibrinous, sero-fibrinous, or purulent. Pain in the præcordial region, palpitation of the heart, and extreme difficulty of breathing, with great restlessness, anxiety and delirium, are present. The physical signs are easily recognized. *Myocarditis* is infrequent, and usually is associated with inflammation of the endocardium and pericardium; its symptoms are those of progressive degeneration of the heart-muscle and dilatation, with irregular, feeble, rapid pulse, palpitation, dyspnoea, and syncope.

Cerebral complications occur in from three to five per cent. of the cases, and are usually the result of intense congestion, sometimes of toxæmia. The old-time belief that the brain symptoms arise from metastasis is no longer held. Frequently striking disturbances of the brain are seen in connection with cardiac complications, due to embolism or some other disturbance of the circulatory apparatus. Generally speaking, these disturbances occur in persons who have a natural tendency to brain-complications ("cerebral disposition"), or have through bad habits developed great weakness and irritability of the nervous system. Brain complications, as a rule, are seen in the severe cases only, and then between the fifth and twentieth day; they may appear suddenly as disturbances of vision, hallucinations, difficulty of speech, etc., attended with dizziness and alteration of the pupils, or may follow a sudden aggravation of symptoms, with severe headache, tendency to nightly de-

lirium, and noticeable elevation of the temperature. Delirium is constantly present; it may be low and muttering, but often, and nearly always in adults, is noisy and violent, especially when there is a considerable rise in the temperature. Convulsions sometimes occur. Coma is common when there is hyperpyrexia or uræmia, and must be considered an exceedingly grave symptom. Exceptionally coma sets in without previous delirium or convulsions; if so, the temperature is very high and the case almost sure to advance to a rapidly fatal termination.

Chorea is not uncommon in the lighter attacks among children, and meningitis, especially in connection with ulcerative endocarditis, has been observed occasionally.

Hyperpyrexia is in itself a serious complication, intimately associated, as it is, with the cerebral manifestations just described. The temperature may reach 110°, or more; the pulse is rapid and feeble; prostration is extreme, and there may be delirium and stupor.

The *cutaneous* complications are varied. Sudamina and miliary eruptions are common. Erythema, urticaria, purpura, and a rash closely resembling that of scarlet fever are noticed in many cases. *Pulmonary congestion* may occur and often proves rapidly fatal; pneumonia and pleurisy frequently complicate endocarditis and pericarditis.

The *course* of the disease is somewhat erratic; in many cases the patient appears to do nicely, when the inflammation attacks an articulation heretofore not involved, or a complication may suddenly arise which changes the entire picture.

The *duration* in light cases is from two to four weeks; more serious cases run from three to six weeks; others continue for several months. The affection has been considered self-limited, medication apparently having little or no power to shorten its duration or to materially modify its course. It is held by some that the salicylic acid treatment is almost specific and that in many cases it will reduce the duration of the fever to five or seven days. Clinical experience fails to make good this assertion and proves that relapses under the use of salicylic acid are very common, particularly so if the use of the drug has been discontinued a trifle too soon.

Prognosis.—In uncomplicated cases the prognosis is good; not more than three per cent. of the cases terminating fatally.

Cardiac complications render the prognosis somewhat uncertain, not so much as to the immediate outcome of the case as to the eventual danger of organic disease of the heart. Cerebral rheumatism is always a dangerous complication. Patients who are somewhat advanced in life rarely make a perfect recovery, but remain subject to chronic nervous disorders of a depressing character.

Diagnosis.—The diagnosis is comparatively easy. Rheumatic fever rarely occurs during the first year of life, and the *acute arthritis of infants*, which it somewhat resembles, is recognized from its limitation, usually, to one joint, chiefly hip or knee, with a tendency to purulent effusion (gonorrhœal ophthalmia and vaginitis of the new-born). *Acute osteo-myelitis* or *acute necrosis* in the lower extremity of the femur or tibia have a much greater intensity of the local symptoms, involve the epiphyses rather than the joints, and are accompanied with much more serious constitutional disorders. *Septic arthritis* depends upon the existence of some infectious disease, as scarlatina, typhoid fever, erysipelas, syphilis, pyæmia, etc. *Gout* differs in its mode of onset and in its limitation to a single small joint; in case of an intercurrent attack of rheumatism in a gouty patient the uric-acid test will determine the diagnosis.

Treatment.—The suffering connected with articular rheumatism is so great that every possible effort must be made to afford relief. The bed of the patient should be as comfortable as circumstances will permit; not only should the mattress be soft and elastic, but the sheets and blankets must be kept perfectly smooth. The excessive sweating demands the use of woollen blankets rather than cotton sheets; the former absorb the moisture, while the latter increase the “clammy” sensation which is a source of great discomfort; the danger of taking cold is also much reduced when woollen blankets are used. The night-gown must be changed often; hence the wisdom of having a number of flannel robes made, which can be changed with comparative ease if opened on the outer sleeves and along the entire front. To ease the pain in the inflamed joints, they should be kept at rest by the use of firmly adjusted porous splints, plaster-of-Paris casts, or by packing in sand-bags. Cloths wrung out of hot water, or chloroform liniment, or equal parts of the tincture of aconite root and chloroform, or,

in some cases, cold compresses, may be applied locally. Fuller's solution (carbonate of soda, six drachms; laudanum, one ounce; glycerine, one ounce; water, nine ounces), applied by means of hot cloths, acts soothingly. Osler recommends Paquelin's thermo-cautery. Ichthyol, painted on the inflamed joint, covered with a coating of French chalk, the whole wrapped in cotton and renewed every twenty-four hours, is a recent favorite treatment. Friction is not kindly borne.

The *diet* should be light and nutritious. Milk is excellent and may be diluted with some alkaline mineral water. Broths and soups must be given with discretion; meat and meat-extracts, as a general thing, are not desirable until convalescence is fully established. The patient should drink freely of fresh, pure water or of alkaline mineral waters; crust-coffee, barley-water or oat-meal gruel, diluted with milk and water, are both refreshing and nourishing. The cold pack or sponging in cold water may become necessary during hyperpyrexia. "As a rule, it is better to place the patient in a bath at a temperature of 90°, and gradually cool it down to 65°, or even 60°. The patient should not be kept longer in the bath than the time it takes to reduce his temperature to 101° or 100°. As the temperature continues falling for some minutes after the removal from the bath, he should be rapidly dried and wrapped in blankets, and a stimulant may be necessary. It is seldom found necessary to keep the patient in the bath longer than one hour. In the majority of cases from one-half to three-quarters of an hour is not exceeded. If the reduction is not effected in an hour, there is no reason why the patient should not be kept in longer, as the measure is the only one that gives us any hope of doing good. In some instances a single bath is all that is necessary. If the temperature should, however, reascend, a second bath should be given. There is hardly a limit to the number that may be employed." (Hare's Therapeutics.)

The treatment with salicylic acid is still held in high esteem by many. It is claimed that it gives relief from pain in five hours; that it lessens the swelling of the inflamed joints within twenty-four hours; and that it reduces the average duration of the disease to five days. (Whittaker.) The following is a favorite formula: Sod. salicyl., 2 drachms; glycerine, 1 ounce; peppermint water, 3 ounces. Give from a dessertspoonful to a

tablespoonful every two to four hours, discontinuing the medicine when toxic symptoms—nausea, headache, ringing in the ears, vertigo, etc.—appear. Others admit that under salicylic acid the pain is relieved, but deny that it cuts short the duration of the disease or lessens the danger of cardiac complications, and affirm that under its use relapses frequently occur. Potassium bicarbonate, given every few hours until the urine has become alkaline, then reduced, but continued in sufficiently large doses to maintain the alkalinity of the urine, is said to lessen the danger of heart-complications. Oil of wintergreen, twenty minims every two hours in milk, has many warm advocates. The administration of antipyrin, acetanilid, phenacetin, and allied drugs, has of late become fashionable, chiefly because they reduce fever and relieve pain, but their action upon the blood and their depressing effect upon the heart are very undesirable. Acetanilid should be given in doses of 4 to 8 grs. three times daily; antipyrine in doses of from 10 to 20 grs. every two or three hours until relief is obtained; and phenacetine in doses of from 5 to 15 grs.

ACONITE is beyond question of great value at the beginning of the attack. The pains are shooting, tearing, worse at night; the joints are red, swollen, and very sensitive. When used in the mother-tincture of the fresh root, in half-drop doses every one to two hours, its effect often is surprising, promptly reducing the temperature, fever, and pain. There is no reason why a dilution of this tincture in hot water should not be used locally.—BRYONIA not only relieves the pain, but cuts short the attack. The inflamed joints are slightly swollen and of faintly reddish color, the redness often radiating outwards; sometimes the joint is badly swollen, with much heat and considerable redness. The pains are severe, stitching, tearing, shooting. There is shivering, coldness, fever, sour sweat.—ARNICA has excessive soreness all over and of all the joints on motion. The affected joints are pale and rose-tinted. Bruised pain about the region of the heart. Bruised, stitching, tearing pains. Epistaxis of dark, fluid blood. "Great fear of being approached."—BELLADONNA has great dryness and heat of the body, susceptible to the touch; the affected joint is swollen bright-red, an area of redness extending around it; the pain is tearing, shooting, lancinating. Cerebral rheumatism, with characteristic

delirium. General plethora.—**MERCURIUS**. The affected joints are swollen and pale; sore, sharp pains; jerking, wandering pains in the thighs, shoulders, arms. Pains worse at night, from the warmth of the bed. Profuse sweat, clammy, oily, sticky, often with cold hands and feet. Anæmia; subacute attacks.—**RHUS TOXICODENDRON**. Particularly useful in muscular rheumatism, it is also of service in the articular form after exposure to dampness, with general soreness, copious sweating, aggravations from attempts to move, redness of the affected joints, and shining, œdematous swelling; stitching pain of the parts when touched; great sensitiveness to cold.—**APIS MELLIFICA**. Great soreness of the affected parts; the affected joints are of pale-red color and œdematous; burning, stinging pains; rheumatic pain in the shoulder-blade; numbness; warmth of the body; sweating is accompanied with a sense of comfort and relief.—**CAULOPHYLLUM**. "Rheumatism in small joints, especially of the hands, with cutting pains on closing the hands, especially in women with suppressed menses." (T. F. Allen.) Subacute form.—**FERRUM PHOSPHORICUM**. "Of the shoulders; the pains extend to the upper part of the chest; and of the hands, which are swollen and painful, or of the knee, with severe pain; or of the ankle, with shooting pain." (T. F. A.)

CHRONIC ARTICULAR RHEUMATISM.

An affection of late middle or advanced life. It is frequently seen among persons who are exposed to cold and damp, as laborers, washerwomen, etc. Less often it follows acute or subacute attacks. Anatomically it consists of injection of the synovial membrane, usually with slight effusion and thickening of the fibrous structure of the joint, which, interfering with its free play, causes more or less complete ankylosis; eventually there is atrophy of the muscles standing in anatomical relation to the affected articulation, due to disuse, to nervous influence, and to pressure on the muscles and vessels involved.

The **symptoms** are chiefly stiffness and pain of the involved joints, with little, if any, swelling or redness. The pain is greatly increased by motion, change of weather, overexertion,

exposure to cold and damp. Usually the greatest amount of discomfort is felt from the first muscular effort made after a prolonged rest; such as a night's sleep; after stirring about for a time, the stiffness and soreness gradually grow less and disappear. In some cases the joint is sore to the touch. In the course of time ankylosis may develop, with more or less deformity of the joint.

The general health is not materially affected, save in cases where constant severe pain eventually weakens the system, followed by digestive disturbances, anæmia, and neuralgic affections, or in the more exceptional instances where valvular lesions of the heart complicate the case.

The prognosis is bad so far as it refers to a cure, although under favorable circumstances even perfect recovery may take place. The disease does not materially shorten life except through its complications.

Treatment.—Residence in a warm dry climate, free from sudden and great changes, is of supreme importance and, if within reach of the patient, must be insisted upon. The same applies to the house in which the patient lives; if damp, every effort to give relief will prove unavailing. Flannel must be worn next to the skin, and general health maintained by close attention to the details of sound hygiene. Massage and passive motion should be practiced perseveringly; this treatment is mildly stimulating, improves nutrition, and lessens the immobility of the joint. If there is much pain, dry heat, persistently used, often proves of great benefit. Warm baths, taken at any of the hot sulphur springs, are usually helpful if used long enough and under the direction of a competent medical man. The temperature of these waters should range from 96° to 114°. Hot mud-baths often afford relief promptly. America abounds in these springs. Arkansas, Canada and Michigan in the East, and New Mexico and Southern California in the West, and other States, offer every opportunity for testing the merit of this treatment. Old age, organic disease of the kidneys, especially when complicated with degenerative changes in the arteries or hypertrophy of the left ventricle, are counter-indications.

Therapeutics.—It is often claimed that the administration of remedies for the relief of chronic articular rheumatism is

little more than a waste of time. This is not true. Excellent results often follow the persevering use of the indicated remedy.

CALCAREA CARBONICA is a remedy of far-reaching power when the disease occurs in patients of a leuco-phlegmatic temperament suffering from malnutrition, tendency to clammy sweating (especially of the feet), coldness of the feet, general catarrhal predisposition, and scrofulous troubles of the eye-lids and ears. The swelling of the joints is well pronounced and often is the effect of working in water. Aggravations from every change of weather; crackling crepitation in the affected joints; gouty nodosities about the small joints, especially about the fingers. There is much bodily weakness, particularly weariness of the limbs, rendering it difficult to go up stairs. Deficient powers of resistance.—**CAUSTICUM**. Rheumatism in the shoulder and articulation of the jaw. The joints feel stiff; the tendons are shortened, drawing the limb out of shape. Pain is tearing, stitching, piercing; worse in the evening, better in the morning; renders him restless and compels him to move about, without, however, getting relief from motion; worse from east wind and from dry cold weather, during snow storms; relief from warmth. Paralytic weakness of the extremities; trembling weakness of the hands. Restlessness at night; he uncovers himself; gets up in the morning utterly despondent, but feels better as the day advances. Tendency to soreness and chafing in the folds of the skin. Weakness of the sphincter of the bladder.—**HEPAR SULPH. CALC.** is indicated in scrofulous persons who sweat easily (sour perspiration), are anæmic, exceedingly sensitive to cold, and who have had "thorough" mercurial treatment. The affected joints are moderately swollen; there may be some redness and a sensation as if the joint had been sprained. Pains as though a splinter were sticking into the joint.—**LYCOPodium** is useful in old people who suffer from malnutrition, are emaciated, melancholic, peevish. The hands especially are affected; the pain, which is tearing, grows worse during the day until evening, when relief is had. Its well-known dyspeptic symptoms often call attention to it; there is almost canine hunger, but as soon as he begins to eat the stomach feels full and distended, and he is obliged to stop. Gastric flatulency; atonic dyspepsia. He craves being in the open air, and often suffers from chronic eczema.—**SULPHUR**. Sensitiveness to cold, wind, open air,

change of weather; relief from heat; aggravation from washing in cold water; burning heat of the feet. Scrofulous skin-troubles which occasionally get better, the improvement being followed by aggravation of the rheumatism. Mental irritability. Rheumatic affection of the knee-joint.

BRYONIA, PULSATILLA, RHUS TOXICODENDRON, MERCURIUS, NUX VOMICA, and others, are at times indicated by clear-cut constitutional characteristics.

MUSCULAR RHEUMATISM.

Muscular rheumatism, myalgia, or myodynia, usually affects single muscles or groups of muscles, chiefly the voluntary, but sometimes the involuntary muscles, as those of the œsophagus and bladder. The exact seat of the affection is not known, but probably all the tissues constituting a muscle are involved.

The disease usually results from exposure to cold or sudden chilling by a draught of air, especially if only one side of the body is exposed. An unusual exertion, as heavy lifting or a strain, may develop a severe attack, probably of lumbago. Men suffer from it oftener than women, especially men whose occupation involves exposure. Previous attacks of the disease and the gouty and rheumatic habits are important predisposing causes. The affection occurs in the acute, subacute, and chronic form, and is frequently accompanied with articular rheumatism.

No characteristic pathological features have been observed save, in case of death from muscular rheumatism, granular or vitreous degeneration of the muscular tissue.

The symptoms are clear-cut, consisting chiefly of severe pain in the affected muscle. This may be a dull, bruised pain, or tearing, sharp, cramp-like. It may be constant or paroxysmal, or migratory, wandering from place to place. It is aggravated by changes in the atmosphere, toward evening, usually by the warmth of the bed, and intensely so by motion. To avoid the latter, the patient invariably seeks to maintain a position which allows relaxation of the affected parts. Severe pressure often affords relief. The disease really is local in character, and

rarely accompanied by constitutional symptoms, including fever. Its duration is variable; some attacks disappear in a few hours; others continue for several days; not infrequently they drag along for many weeks.

As a matter of convenience special terms are used to denote involvement of different sets of muscles. Thus, *lumbago* affects the muscles of the loins and their attachments. It is a common form, frequently results from over-exertion, and is oftenest seen among laboring men who are obliged to lift heavy weights. It is exceedingly painful, rendering even slight motions, as turning in bed or rising into a sitting posture, practically impossible. *Pleurodynia* involves the intercostal muscles of one side—usually the left—, occasionally also the pectorals and the serratus magnus. The necessary maintenance of the respiratory movement renders physiological rest of the affected muscles impossible, hence the distressing character of this form. The act of coughing or of a deep inspiration may become agonizing. It greatly resembles intercostal neuralgia, but the rheumatic pain is more continuous, less circumscribed, and there are no tender spots along the course of the nerves. From pleurisy it is differentiated by the absence of characteristic physical signs. *Torticollis* or wry-neck involves the antero-lateral region of the neck, sometimes also the muscles of the back of the neck. It fixes the neck, so that the entire body must be turned in order to turn the neck. It usually affects one side, and is more often found among the young. In other cases the muscles of the abdomen may be affected; or those of the shoulders (scapulodynia); or of the upper back (omodynia, dorsodynia); or those of the head (cephalodynia).

The prognosis as to life is good. No serious complications, as of the heart, need be feared. The attacks, however, recur frequently.

Treatment.—The necessity of wearing warm clothing and of avoiding exposure to dampness and cold is apparent. Persons who are subject to muscular rheumatism should make free use of alkaline mineral waters.

An acute attack having begun, a Turkish bath, followed by massage and a thorough rubbing in alcohol, not infrequently stops it. Hot fomentations usually are grateful to the patient; in exceptional cases they may aggravate the pain. Electricity

may be of service. Rockwell (Bigelow: International System of Electro-Therapeutics) recommends static electricity, though admitting that excellent results may be obtained from the galvanic or faradic current. He advises the use of the latter, preferably the galvanic, when the pain is of a neuralgic type, with much tenderness to pressure. When the pain is dull and aching, deep-seated, not aggravated, but possibly relieved, from pressure—as in the subacute or chronic form—he uses static electricity. “The method to be adopted is the simple one of insulation and submitting the patient to the effects of the roller electrode over the affected part.” In pleurodynia, firm strapping of the side affords great relief. In lumbago, Osler speaks highly of Ringer’s method of treatment by means of a puncture, thrusting needles, from three to five inches long, deep into the lumbar muscles at the seat of pain, withdrawing them after five to ten minutes; he states that relief often follows at once.

BERBERIS. “In lumbago one of our most valuable remedies; pains extend from the back around the body and down the legs, with red and mucous sediment in the urine” (T. F. Allen). Recommended by J. T. O’Conner when there are renal, cystic, or hepatic complications.—**BRYONIA.** Its specific indications are generally known. The remedy is often indicated and acts promptly. It does good work in all types of rheumatism, with stitching, tearing pain, made worse from the slightest motion. Easy, profuse perspiration.—**CIMICIFUGA.** The fleshy part of the muscle is affected; twitching and jerking of the muscles, especially of the left side. Tendency to neuralgic affections; stiffness and sense of contraction in the muscles of the neck and back; pleurodynia (right side); “electric shocks.”—**DULCAMARA.** After getting wet or cold; from living in damp rooms or from cooling the body when heated; from working in cold, damp places, cellars, ice-houses, etc. Stiffness or lameness across the neck and shoulder; lameness of the small of the back; severe drawing pains in the muscles of the back. When the weather has suddenly changed to damp cold. Sticking, drawing, tearing pains, often with a sensation of numbness.—**KALMIA LATIFOLIA.** The pains shift about constantly, are of a tearing, pressive, drawing character, and accompanied with a feeling of almost paralytic weakness. Severe pain at the heart.—**LEDUM.** Pain changes location suddenly; it is of a

sticking, tearing character, often "bruised"; affects also the smaller joints; coldness of the feet and of the affected parts; aggravation of the pain from the warmth of the bed.—**NUXVOMICA**. Wry-neck from cold and nervous shock. Rheumatism of the large muscles of the back, trunk, and neck; the back feels bruised and lame; aggravation from lying on the back, but he cannot turn over on account of the pain it causes; sensitiveness to cold air; chilliness from motion; paralytic weakness of legs; violent twitching and jerking of the affected muscles; irritability; characteristic gastro-intestinal symptoms.—**PHYTOLACCA**. Subacute or chronic form, especially after the abuse of mercury. Shooting, lancinating, tearing pains; sometimes heavy aching; change locality often. Affects the tendinous attachments of muscles. Dorsal rheumatism. Worse from damp weather and at night. Obstinate rheumatism of the heels, only relieved by keeping the heels higher than the body.—**RHUS TOXICODENDRON**. One of the best remedies when the muscles of the back are affected; with aggravations from cold and rising; better from bending backward and from dry heat. Lameness and stiffness in the back, with relief from continued motion. Drawing, tearing pain and intense lameness in the back.

Consult also **CAUSTICUM**, **RHODODENDRON**, **PULSATILLA**, **RANUNCULUS**, **TARANTULA**, **HAMAMELIS**. If chronic, **CALCAREA** and **LYCOPodium**.

GONORRHŒAL RHEUMATISM.

This affection is really a synovitis or arthritis, subacute in character and tedious in its duration, caused by infection from the urethral discharge during an attack of gonorrhœa. It occurs oftener in men than in women. It attacks the joints, by preference the knees and ankles, but also, exceptionally, joints which are usually exempt from rheumatism, as the sternoclavicular, the inter-vertebral, temporo-maxillary and the sacroiliac.

"The inflammation is often peri-articular, and extends along the sheath of the tendons. When effusion occurs in the joints,

it rarely becomes purulent. It has more commonly the character of a synovitis. About the wrist and hand suppuration sometimes occurs in the sheaths. In the bacteriological examination the gonococci have been found in the exudate, but not invariably. They may be present in the tissues, however, and cause an effusion which may be sterile." (Osler.)

Clinical History.—Gonorrhœal rheumatism commonly occurs from three to twelve weeks after the original gonorrhœal infection. It usually attacks the (left) knee, somewhat less often the ankle, the joint becoming stiff, slightly painful and swollen. The slowness with which the process develops in the joint establishes a large degree of tolerance; thus in the course of time the enlargement may become very great without causing severe pain, although rest at night in the more serious cases is usually much broken. Fluctuation in the joint, when the effusion is at its height, may be discovered by palpation. No marked constitutional symptoms are observed. There may be copious sweating, but it is neither acid nor drenching like that of true rheumatism, from which it is further distinguished by the absence of sudden improvement of the affected articulation, of shifting from joint to joint, and of cardiac complications.

Modifications of the course as outlined may occur. Occasionally the patient suffers much and long from wandering pains about the joints (*arthralgic* form); or several joints may become affected, with swelling, tenderness and light fever, closely resembling a subacute articular rheumatism, even giving rise to cerebral and cardiac complications (*rheumatic* form); or the affected joint may become the seat of extensive peri-articular œdema, with severe pain and, in exceptional cases, suppuration (*acute gonorrhœal arthritis*); or the tendons, bursæ, and periosteum rather than the articulation proper may be involved (*bursal* and *synovial* form); or there may be *chronic hydrarthrosis*, involving one joint, preferably the knee, often without pain, redness, and swelling, and rarely with formation of pus.

The course of this affection is exceedingly tedious, and frequent relapses occur. Once cured, the patient remains well, except as a new gonorrhœal infection may bring on another attack of the disease, in which case there is increased danger of permanent injury to the joint. Iritis is a not uncommon complication.

The diagnosis depends upon the history of gonorrhœal infection, upon the absence of acid sweating, the limitation of the disease usually to one joint, and the perverse, tedious character of the case.

The prognosis as to life is good, but permanent injury to the articulation is liable to result from repeated attacks.

Treatment.—Electricity (constant current) has done good service. Fixation of the joint and the thermo-cautery are indicated when the pain is severe; massage and passive motion may be used later. Incision and irrigation are now practised extensively among surgeons. If there are still present symptoms of gonorrhœa, they should receive prompt and careful attention.

Excellent results have also been obtained by the long-continued use of hot springs and mud-baths.

Helmuth recommends CLEMATIS when the disease sets in early after gonorrhœal infection and when there is a tendency to orchitis.—THUJA when there is tearing, pulsating pain, or pain as from subcutaneous ulceration, with sensation of coldness or torpor of the part.—VERATRUM, bruised feeling in the joints, better from walking; weakness and trembling in the affected parts.—CIMICIFUGA, PHYTOLACCA, KALMIA, GELSEMIUM, KALI HYDRIODICUM, SEPIA, EUPHORBIVM, MERCURIUS SOLUBILIS, STANNUM and RHUS are suggested by the same authority.

RHEUMATIC ARTHRITIS.

Synonyms: arthritis deformans; polypanarthritis; nodosity of the joints; progressive chronic articular rheumatism; general and partial chronic osteo-arthritis.

A chronic disease of the joints of the extremities, with characteristic changes in the cartilages and synovial membranes, resulting in the formation of bony growths (osteophytes) and great deformity.

Ætiology.—Rheumatic arthritis may occur at almost any time of life, but is usually seen after the meridian of physical vigor has passed, or, if earlier, under circumstances which show a premature decay of vital energy. It is much more frequent

in women than in men, and, according to Lyman, occurs especially during the fifth decade of life. Statistics show that women from twenty to thirty years of age are frequently the victims of this affection, but its occurrence at that time of life is connected with child-birth, lactation, or too frequent child-bearing, a fact which seems to prove that physical exhaustion is in reality an exciting factor. Women suffering from uterine affections are said also to show a tendency to the disease. In men rheumatic arthritis shows itself later in life, is more frequently the result of traumatism, and generally affects one of the large joints, as the hip. In the case of young children the disease runs a rapid course and very pronounced deformities occur within a short time. Rheumatic arthritis is seen among both rich and poor, but the exposures and hardships which the laboring classes encounter daily render them particularly liable to the disease. The assertion is made that dampness and cold have not been proved to be ætiological factors; it is, however, true that persons exposed to these influences are among the chief victims of rheumatic arthritis. An inherited tendency (Garrod: 216 out of 500 cases) has been demonstrated in many instances, usually among families of scrofulous or phthisical habit, and most prevalent among the poor. Local injuries play an important part in the latter part of life, especially in men, and they often result in such forms of rheumatic arthritis as *morbus coxæ senilis*.

The exact ætiology is still in doubt, but there is an inclination to adopt the theory of the neurotic origin of rheumatic arthritis, as taught by Charcot, Benedikt, and Remak. In support of this theory the argument is advanced that the disease commonly follows depressing influences, such as deep grief, worry and care; that it bears considerable resemblance to other joint deformities of established nerve origin; the symmetrical distribution of the lesion; the extent of the muscular atrophy, which is often quite out of proportion to the extent of the local disease; and the occurrence of certain more distant effects which must be trophic, as in the skin and nails.

Morbid Anatomy.—The changes going on in the affected joint begin with cell proliferation of the cartilage and synovial membrane; the cartilage assumes a soft velvety appearance, becomes thin, eroded, is absorbed, and exposes the articular ex-

tremities of the bone. Protrusion of the thickened exterior margin of the articular cartilage results in the formation of irregular nodules which ossify (osteophytes) and by their presence cripple and lock the joint. The denuded extremity of the bone assumes an ivory-like hardness and polish (eburnation). These changes eventually result in a false ankylosis and deformity of the articulation; when they occur in the vertebral articulations, they lead to true ankylosis. In aged persons the affected bone becomes spongy, the spaces formed being filled with a soft substance not unlike marrow; atrophy of the heads of the diseased bones results as the effect of extensive wasting, and there are produced extraordinary deformities. Muscular atrophy in the neighborhood of the affected joint often is well marked, and neuritis of the peripheral nerves occurs frequently.

Symptoms.—Charcot's division of rheumatic arthritis into a) Heberden's nodosities; b) general progressive form; c) mono-articular form, greatly facilitates an understanding of the clinical history.

Heberden's nodosities (digitorum nodi) are hard nodules, formerly thought to be of gouty origin, which appear on the sides of the last phalanges of the fingers. They are associated with tenderness, swelling, and slight redness; after a time, a bony growth on the ulnar side of the articulation pushes the terminal phalanx toward the radial side of the hand. The fingers are eventually drawn toward the ulnar side of the hand, with lateral distortion of the enlarged knuckle, mainly due to the relaxation of the articular ligaments. These nodosities appear oftener in women than in men, usually between the thirtieth and fortieth year of life, and are rarely accompanied with disturbances of the general health. There is no excessive pain, though considerable sensitiveness to rough touch or a knock, with periodic exacerbations at long intervals or from imprudence in diet. The condition is not curable, but involvement of the larger articulations is rare.

The *general progressive form*, in its *acute* manifestation, is seen in young women of twenty to thirty years of age. It is liable to occur in connection with childbirth, over-lactation, too frequent pregnancies, or other severe drains from which women at that age suffer; it has also been observed at the menopause

and may occur in childhood. The first symptoms closely resemble articular rheumatism; many joints are simultaneously affected; there is considerable swelling, and frequently some fever. The general health suffers more or less, but often after a time abatement of the symptoms brings relief until another pregnancy or confinement gives rise to a violent exacerbation. The *chronic* form, by far the more frequent, begins with stiffness in the joints which soon leads to a lack of accustomed dexterity, a serious affection when occurring in needle-workers and people who, like pianists, need nimbleness and deftness of the fingers. This stiffness at first is greatest in the morning, and passes off during the day, but soon becomes permanent. Then pain on movement is noticed, with slight swelling in the joint and its immediate neighborhood. The joints of the hand are first affected, then the knees and feet; gradually other articulations are involved, symmetry of both sides of the body being maintained in the larger number of cases. Characteristic anatomical changes now occur, i. e., thickening of the capsular ligament, the formation of osteophytes, eburnation of the articular extremities of the bones, and, later, muscular retraction. While these changes are taking place, a distinct crepitation sound may be heard upon moving the joint. Soon spurious ankylosis results, muscular atrophy, contractures of muscles and flexion of the extremities, so that in an advanced case the patient is rendered absolutely helpless. Intense pain is frequently present. It may continue for many months, even years, but usually passes away when the more active changes in the joints have ceased. In some cases the patient enjoys freedom from acute suffering.

The constitutional symptoms are wholly overshadowed by the local affection. There is usually indigestion, which is largely due to the enforced quiet of the patient, and there may be anæmia.

The mental condition, during this period of ill health and suffering, is naturally one of despondency and irritability. It is, however, not unusual to see old people, far advanced in the disease and hopelessly crippled, enjoy good general health and be quite content, especially if there has been saved them a reasonable degree of usefulness of the hands. The latter is often the case since, as a rule, the thumb is not affected. The deformity of

the hand is such that it has frequently been compared to a "bird's claw" when first lifted from the perch. In the foot the disease commonly begins with involvement of the big toe.

Rheumatic arthritis advances by exacerbations and abatements, and progresses symmetrically.

The *mono-articular form* does not differ from the polyarticular form save that it affects one joint only. It is a disease of advanced years, more particularly affects men, and frequently is the result of traumatism. If the hip is involved, it constitutes *morbis coxæ senilis*; if the vertebral articulations are its seat, *spondylitis deformans* results, producing fixation of the spinal column, etc., and if cervical, preventing any movement of the head save that of rotation.

Diagnosis.—The diagnosis offers no difficulty. The occurrence of the disease, often, in those who are old; its freedom from characteristic sour sweating, cardiac complications and, usually, fever; its progressive character and the permanency of its location in a certain joint, distinguish it from *acute rheumatism*. The involvement of so many joints and the characteristic deformities which follow should prevent its being taken for *chronic rheumatism*. From *gout* it is distinguished by the large number of articulations involved, by its slow and gradual development, the absence of chalky deposits about the joints elsewhere, and by the absence of those violent exacerbations to which sufferers from gout are subject. It is more difficult to differentiate between rheumatic arthritis and the *local arthritis of the shoulder joint* which is characterized by pain, thickening of the capsule and ligament, wasting of the shoulder-girdle muscles, and sometimes by neuritis. This affection of the shoulder-joint is curable in a majority of the cases.

Prognosis.—The prognosis, as to life, is good, many cases living to an old age. As to a cure, the outlook is practically hopeless, although arrest of the affection in an early stage may occur even without treatment, while in other cases a great deal of relief may be afforded by taking appropriate measures.

Treatment.—Residence of the patient throughout the year in a suitable climate and under proper sanitary and hygienic surroundings, with due attention to his minor ailments, such as indigestion, is important. Food should be both nourishing and easily digested. Stimulants, used in moderation, are kindly

borne and sometimes of service. Cod-liver oil is exceedingly useful.

When there is much pain in the joint, perfect rest must be insured; the application of hot compresses at night will be found very comforting. After the pain has subsided, gentle friction should be used by the hour, to promote absorption of the effusion, improve the nutrition of the muscles and to maintain and restore mobility. Massage is of great importance and undoubtedly tends to prevent the retraction of the muscles and subsequent flexion of a limb. Hot baths are advised in the early stage, but are considered worse than useless later. Cold baths and sea-bathing are prohibited.

Electricity is both condemned and advocated. Lyman (Pepper's Amer. Textbook) advises galvanism "for the relief of pain and for the prevention of muscular atrophy and deformity. A large sponge electrode, representing the positive pole, should be placed upon the back of the neck or over the lumbar region, while the negative pole is connected with a dish of warm salt-water in which the feet are placed. The duration of the treatment should not exceed ten or fifteen minutes every day for the first month, after which time the applications may be made every other day or at longer intervals."

As to *medication*, the dominant school cling to arsenic and to the iodides, usually the iodide of iron. Speaking from the standpoint of a homœopath, it is safe to affirm that the old-time antipsorics hold the key to successful medication. CAL-
CAREA CARBONICA, especially, covers a totality of symptoms which renders it exceedingly useful.—LYCOPodium, SILICA, IODUM, and LITHIUM CARBON., constitute a group which ranks next in importance. AMMONIUM PHOSPHORICUM, PHOSPHORUS, KALI HYDRIDICUM, NUX VOM., BENZOIC ACID, CAUSTICUM, LEDUM, RHODODENDRON, GUAIA-CUM, and other so-called "anti-rheumatic" remedies should be carefully studied.

The totality of symptoms governs, and a close study of the materia medica affords the only means of arriving at the true remedy.

GOUT.

Gout is a disorder of nutrition, characterized by the presence of uric acid in the blood, attacks of acute arthritis in one or more of the smaller joints, and the deposition of sodium urate in and about the joints; it is accompanied with irregular constitutional symptoms.

Ætiology.—Heredity. In from forty to seventy-five per cent. of all cases parents or grandparents of the victims of gout have been sufferers from the same cause. It is almost always inherited from a male ancestor, and, so far as *age* is concerned, most frequently attacks persons between thirty and forty years old. In exceptional cases children, and even infants, have had gout. Persons well advanced in life have suddenly developed the affection, but there is slight danger after the sixtieth year has been safely passed. It is generally conceded that the free use of *alcoholic stimulants*, especially of the heavier fermented liquors, is an important ætiological factor, yet it cannot be denied that the facts frequently cited to disprove this assertion are of much weight. The same may be said concerning *food*. Constant liberal indulgence in meats is undoubtedly harmful, particularly in persons predisposed to gout, because such a diet lessens the alkalinity of the blood and its power to hold in solution the urates. Yet, many victims of gout have an excellent digestion in spite of their deliberately ignoring all restrictions as to diet, and others are great sufferers in spite of constant self-denial.

An *inherited tendency* is by all means the most important predisposing cause, and high, generous living, free indulgence in all the pleasures of the table, and late and irregular hours are almost sure to intensify the predisposition, especially in persons who shun active physical exercise. These habits belong to the rich; hence the frequency of the affection among the upper classes.

On the other hand, the poor are not exempt from gout. Laboring men who are much exposed to inclement weather, who do hard manual labor, and who indulge copiously in fermented liquors, especially in beer and porter, as do the ballast-

ers on the Thames, are often gouty. Workmen in lead, as compositors, painters, and plumbers, also furnish a large per cent. of victims.

The essential feature of gout is an increase of uric acid in the blood, due to increased production or lessened elimination, with a partial loss of the alkalinity of the blood. Garrod's theory is summed up as follows by J. T. O'Conner: "The normal amount of uric acid in the blood may be augmented either by increased production or by lessened elimination; in gout the kidneys are always implicated, functionally at first, and structurally in the chronic stages; the acid may exist in the circulating fluid, for a time at least, without the development of inflammatory symptoms; true gouty inflammation is always accompanied by a deposition of urate of soda in the inflamed part; the deposit is crystalline and interstitial, and may be looked upon as the cause, and not the effect, of the gouty inflammation; the local inflammation in gout tends to the destruction of urate of soda in the blood of the inflamed part, and hence of the system generally."

While the uric acid theory is generally accepted, there is now a tendency to admit that Cullen may have been correct when he considered the nervous system the primary cause of all the mischief. "Uric acid is not the cause of gout; it is the gout, on the contrary, which causes the excess of the uric acid." (F. Woodbury, in Journ. of Amer. Med. Association.) The close relation held by depressing influences of mind and body to attacks of gout is one of the important facts cited in support of the nervous theory of the causation of gout.

Morbid Anatomy.—The blood-serum contains uric acid, which, however, is also found in the serum of persons suffering from gravel, leucocythemia, and cirrhosis of the liver. The most striking pathological changes occur in the affected joints, which show a "chalky" appearance of the cartilage, due to infiltration of urate of sodium; this infiltration extends to the ligaments and neighboring tendons, and later affects the synovial membrane, urates appearing freely in the synovial fluid. Erosions of the articular cartilage occur in more advanced cases. The joints most frequently affected are the great toe, then the ankles, knees, and the small joints of the hands and wrists. Ulceration not infrequently takes place as the result of these

deposits, the ulcerated surface exposing solid concretions or discharging pasty masses of imperfectly crystallized urates, chiefly of sodium, but also urates of calcium in small amounts. The chalky deposits about the small joints result in stiffening, moderate deformity, and ankylosis. Chalk-stones (tophi) are also formed in other parts of the body, more commonly in the pinna of the ear along the margin of the helix; they have also been noticed in the eye-lids and alæ of the nose, on the palmar surface of the fingers, on the ulna, tibia and corpora cavernosa of the penis; they lie immediately under the skin, and in size vary from a grain of sand to a pea.

Ebstein looks upon the primary local changes as a local necrosis which is due to the presence of an excess of urates in the blood. The deposit, as has been stated, is always interstitial and is thickest at the part most distant from the circulation.

The *kidneys* present the features of an interstitial nephritis (contracted kidney or arterio-sclerotic form) with deposits of uric acid in the straight uriniferous tubules, the pyramidal portions, calices and pelvis, and of urate of sodium in the connective tissue parallel to the uriniferous tubules in the pyramidal portion of the kidneys. Circumscribed spots of necrotic tissue, cysts and, occasionally, amyloid degeneration have been observed.

The *heart* is frequently hypertrophied on the left side; sometimes there is dilatation of the heart cavities and fatty degeneration of the heart muscle; deposits of urate of soda have been found on the valves. Atheromatous changes are not infrequent, resulting in partial obliteration of the lumen of the affected vessel and disturbances in the nutrition of the heart, brain, or other organs. The *respiratory* organs in rare cases show gouty deposits (vocal cords, walls of the bronchia), but emphysema, chronic bronchial catarrh and asthma are common in old cases. *Liver*. Fatty degeneration of the liver is common in obese sufferers from gout; cirrhosis is not infrequent, though, perhaps, due more often to habitual intemperance than to the presence of gout. Urates are rarely found in the alimentary canal. The *gastro-intestinal* disturbances which are so constantly seen in gouty patients are the effect of indigestion brought on by excessive eating and drinking; the *brain* symp-

toms occasionally observed are the result of vascular disturbances.

Symptomatology.—Gout presents itself in the acute, chronic, and irregular form (lithæmia).

Acute Gout.—An acute attack is usually, though not always, preceded by symptoms of indigestion, mental depression or irritability of temper, restlessness, especially at night, and twinges of pain in the small joints of hands and feet; the urine becomes acid, scanty, high-colored, and on cooling deposits urates. The paroxysm sets in during the early hours of the morning, usually between one and three o'clock, the patient being roused from sleep by an agonizing crushing pain, generally in the ball of the (right) great toe, which rapidly grows in intensity. There is heat, swelling, shining redness and extreme tenderness of the part to touch, so that the weight of the blanket can scarcely be borne. With it, there is great restlessness and a considerable fever, the temperature rising to 102° and 103°. Toward morning, at 5 or 6 A. M., the severity of the pain becomes greatly lessened, fever disappears, the bodily surface becomes moist, and the patient may fall into a sleep from which he awakens much refreshed, but with a swollen joint. The next night brings a repetition of the attack, running the same course, and repeated nightly for from four to eight nights.

In some cases other joints may be involved, especially the opposite great toe; exceptionally the pain may continue throughout the day. The inflammation never proceeds to suppuration. Improvement is indicated by lessened tension of the skin over the affected joint and pitting on pressure; itching and desquamation of the skin accompany the subsidence of the swelling.

The seizures in new cases usually occur during the spring months. The attacks leave the patient in improved general health, but with a very pronounced tendency to a recurrence of the paroxysm in four or six months, oftener a year. Recurring attacks invade successively the foot, ankles, knees, hands, wrists, and elbows; they grow less and less violent, but continue for a longer period of time, and each time leave the patient in a less perfect state of health; in other words, the case becomes chronic.

Occasionally, during an acute attack the local symptoms suddenly show a remarkable improvement, even to complete disappearance; at the same time severe constitutional symptoms set in which are always serious and may prove fatal. Such cases are described as cases of *retrocedent* or *suppressed* gout. The usual form of their expression is in the gastro-intestinal tract (severe pain, vomiting, diarrhœa, profound prostration) or in the heart (pain, dyspnœa, irregularity of heart's action, sometimes acute pericarditis). Threatening cerebral symptoms may develop, as delirium, coma or apoplexy; these may be due to disease of the blood-vessels or to uræmia.

Chronic Gout.—In the chronic form there is increasing frequency of the paroxysms, and less perfect recovery from each successive attack. In the course of time the permanent changes peculiar to gout are developed. The affection involves a larger number of joints; chalky deposits take place in the articulation and at distant points, with ulceration of the skin over the tophi and, often, free exposure of the concretions at the knuckles. Dyspepsia may prove persistent; arterio-sclerosis and later cardiac hypertrophy (left-sided) develop; the urine is of persistently low specific gravity, and the patient suffers from the many and varied symptoms which arise from involvement of the kidneys, heart, and other organs, which have been described.

Irregular Gout.—Under this head are comprised a train of well-defined symptoms which in their totality constitute the lithæmic or arthritic diathesis. Lithæmia is inherited or acquired, oftener the former. It makes itself felt throughout life, and is characterized by an excess of uric acid in the system, resulting in periods of irritation of the nervous system which is expressed chiefly by hemicrania, neuralgia, vertigo, tinnitus aurium, flushing of the face, sensory disturbances, mental depression and irritability, and eruptions of the skin, commonly of an eczematous character. The direct cause of these symptoms is undoubtedly a disordered nutrition, inherited or acquired. Lithæmia, though entailing a great deal of annoyance, may exist throughout life without a well-defined outbreak of gout.

The lithæmic diathesis in early childhood finds its most common expression in eruptions of the skin, chiefly eczema and

impetigo, with pronounced tendency to catarrh of the respiratory mucous membrane; in such cases cold in the head, sore throat, tonsillitis and bronchitis result from trivial exposure, and not infrequently alternate with cutaneous eruptions. Susceptibility to arthritic rheumatism becomes evident as the child approaches puberty. In early adult life the same tendency to catarrh is seen, often throwing itself upon the genito-urinary mucous membrane; there are frequent and easily provoked blennorrhagic and gonorrhœal affections which readily extend into the bladder and epididymis. Urethritis often occurs from a pure intercourse, and even spontaneously. The eczematous tendency continues, and corpulent lithæmics suffer much from erythema and intertrigo. During the years of mature adult life indigestion develops, of an acid character, with headache, constipation or gastro-intestinal catarrh, and itching, at times bleeding, hæmorrhoids. The respiratory mucous membrane still maintains its hypersensitiveness and irritability, as is shown by naso-pharyngeal catarrh, often extending into the middle ear, and chronic bronchitis. In due time, the nervous system gives evidence of great weakness and irritability, and the patient suffers from headaches, dizziness, peevishness, fretfulness, disinclination to mental effort, torpidity of the liver and a settled disposition to so-called biliousness. The urine, all this time, is acid and high-colored, containing lithic acid, crystals of which may be deposited on standing.

Gouty glycosuria and oxaluria may be present at certain periods, and there is said to be a special liability to the formation of calculi, an assertion which, however, is denied by some authorities. Arterio-sclerosis may occur as a renal, cardiac, or purely vascular manifestation. Aneurism is a possible consequence of such changes, and fatal results may follow the rupture of a blood-vessel; if in the brain, apoplexy occurs.

Diagnosis.—Gout is distinguished from *articular rheumatism* by the history of a gouty predisposition, mode of living, appearance of the attack, and for a long time fixation in one joint; unusual tenacity, as to duration; close relation between the height of the fever and the intensity of the local inflammation; frequency of gastric disturbances; characteristic renal and cardiac complications; relative importance of diet in its effect upon the case. *Chronic rheumatism* has a preference for large

joints; gout for small joints. The differentiation between gout and *arthritis deformans* is drawn by Whittaker as follows: "Gout affects most frequently males, arthritis females. Gout chiefly affects the upper, arthritis the lower, classes. Gout begins in the toes, arthritis in the fingers. Gout swells and dislocates the joints of the big toe, and afterward of the other toes. Arthritis commences by preference in the fingers, which it also swells and dislocates, as a rule, in a more regular way, so as to imbricate the joints of the first three fingers, pointing the fingers toward the ulna. Gout, when it affects the hand, does not to the degree of arthritis spare the thumb. The deformities of arthritis are produced by outgrowths of bone; of gout, by deposits of sodium urate. So-called cases of rheumatic gout are supposed to represent mixed forms or coincident attacks. The possibility of such a condition may not be denied, but an autopsy decides always in favor of one or the other. In a doubtful case the blood may be examined for urate of sodium. If two drachms of blood serum be slightly acidulated with acetic acid in a watch-glass, and a linen thread be suspended or laid across the glass, the thread will be found after twenty-four hours covered with crystals of uric acid. Uric acid may also be crystallized out of the fluid of a blister not too near the joint. It is needless to say that this excess of uric acid cannot be detected in rheumatism in any form or in arthritis deformans. It belongs exclusively to gout."

Prognosis.—The prognosis of acute gout, as to duration of life, is good; in the chronic form, especially in the absence of proper habits of living, it is seriously affected by the complications which are liable to occur.

Treatment.—The chief aim of treatment must be the eradication, if possible, of the predisposition to gout, or the arthritic diathesis. Success depends upon the exercise of patience, thoroughness in the study of each individual case, good judgment in outlining the things to be done and those to be avoided, and tact in securing the hearty coöperation of the patient.

The need of such attention to clothing as will reduce to a minimum danger of taking cold from exposure to sudden changes of temperature or chilling of the body, as well as residence in a climate which will as far as possible lessen this danger, is so apparent that bare mention is sufficient. Active

exercise, always stopping short of fatigue, is equally important. To young persons every form of moderate exercise, especially in the open air, is to be commended, since an active life is one of the most efficient means of maintaining a good digestion, proper assimilation of food, and prompt elimination of waste products. Persons who are advanced in life must be as active as their strength allows and, if too feeble to take active exercise, must have the full benefit of massage or Swedish movement. The importance of this advice can hardly be overestimated.

Diet.—The impossibility of laying-down fixed dietetic rules which shall apply to all cases is now very generally realized; in fact, a large portion of the benefit to be derived from careful attention to diet depends upon the amount of discrimination used. Both quantity and quality of food require attention, and of the two, the former is the more important. All the rules concerning the diet of gouty persons are compressed in eating with moderation and in reducing very materially the amount of nitrogenous food and of carbo-hydrates usually taken. As to *meats*, they should always be used sparingly. In children and young persons it is well to dispense with them almost entirely; but it is not wise to withdraw them altogether in the case of older persons who are accustomed to them. Meat once a day can safely be taken by the majority of gouty people who live a moderately active life; if of persistently sedentary habit, it is wise to limit the amount which may be eaten even at this one meal. White meat is preferable to dark. It is always best roasted. Pork, especially salt-pork, and veal are bad; oysters, egg and fish are good; lobster, crabs, etc., must be prohibited, particularly in the form of salads. Fat meat must be avoided by corpulent gouty persons.

Fruit may be used according to natural desire if it does not derange digestion; it should be thoroughly ripe, and eaten without sugar. Oranges and lemons are least liable to do mischief; melons, bananas, peaches, and other sweet fruits, must be taken cautiously, if at all.

Of *vegetables*, potato must be used sparingly; spinach, lettuce, tomatoes and cucumbers are allowable; asparagus, rhubarb and sorrel should be avoided. Hot cakes, hot rolls, corn, and the various preparations derived from it, are for-

bidden articles of diet. *Milk* is excellent and may be used in large amounts unless, owing to some idiosyncrasy, it disagrees with the patient. Starchy and saccharine articles of food are largely under the ban. Concerning the use of sugar, Duckworth points out that by itself it is not necessarily harmful to the gouty; "but there is evidence to show that if it be freely taken in addition to a varied and mixed diet, especially with certain articles and with wine, an imperfect fermentative process is set up in the stomach and small intestines which tends to provoke flatulency and acidity. It is therefore in this manner that sugar proves harmful to those disposed to gout."

As to *drink*, water, milk, mineral waters, and milk and potash-water may be taken *ad libitum*. Alcohol must be used very cautiously, if at all. Children who have inherited the gouty tendency must under no circumstances be allowed to use alcoholic stimulants, nor the use of ale, porter, beer, or cider; neither should they be permitted to drink tea or coffee. Adults must generally follow the same course of abstinence. Heavy malt liquors and sweet wines, especially champagne, are absolutely forbidden; dry sherry, claret, white wine, old Bordeaux and whiskey without sugar may be used if total abstinence cannot be enforced.

Of *mineral waters*, the Carlsbad, Fachingen, Wiessbaden, Kissingen and Vichy, on the European continent, and the Harrogate and Bath, in England, have an extensive reputation; to have the full benefit of their action, the patient should, however, reside at the springs for a considerable length of time. Of American waters which have proved of value in the treatment of the gouty diathesis the best known are the Saratoga (N. Y.), St. Claire Springs (Mich.), White Sulphur (Va.), Caledonia and St. Catherine Springs (Canada).

Among other measures to be employed are: regular bathing, in the morning or evening, followed by friction, and an occasional Turkish bath, with massage.

In an *acute* attack of gout the limb should be elevated, the joint being wrapped in some soft substance (flannel or, better, cotton wool), with the limb supported on a pillow and covered with a light frame upon which to rest the bed-clothes.

The pain may be relieved by the use of hot fomentations, Fuller's solution, hot whiskey and water applied on soft cloths

(absorbent cotton) on the surface of which tincture of opium or of belladonna may be sprinkled. Extract of hamamelis, similarly used, is often very grateful to the patient.

The general management consists of care in diet, gentleness and patience in handling the affected limb, enforced quiet and rest of mind and body of the patient, the use of Seltzer water, Apollinaris or potash water for drinking purposes, and the exhibition of the indicated remedy. The use of morphia, by the mouth or hypodermically, is discountenanced by some of the best authorities of the dominant school. Vomiting may be relieved by sucking bits of ice; a few drops of chloroform in ice water often stops annoying hiccough; mustard plaster and hot poultices are occasionally required when there is much pain in the stomach.

Should *retrocession* take place, every means must be employed to reëstablish the inflammation in the primarily affected joint; counter-irritation by means of mustard foot-baths is most liable to accomplish this.

Chronic gout requires little, if any, local treatment. If there is ulceration and pus-formation, surgical measures may become necessary. Osler recommends the use of citrate of lithium, five grains three times per day, in a glassful of potash-water.

Therapeutics.—The therapeutics of gout are in a state of lamentable paucity. As yet, no system of therapeutics has produced a remedy which can be prescribed with the assurance that it will give positive curative effects, save COLCHICUM, which in acute attacks greatly and promptly relieves the pain and appears to cut short the attack. The symptoms which the drug has produced upon its provers afford reasonable grounds for the claim that its action here is purely homœopathic.

COLCHICUM “has in a majority of cases a powerful influence over the symptoms, relieving the pain and reducing, sometimes, with great rapidity the swelling and redness. It should be promptly stopped as soon as it has relieved the pain.” (Osler.) If not promptly stopped, violent purging and great general depression are sure to result when the drug is administered in the doses of the dominant school, i. e., from twenty to thirty minims of the wine of colchicum every four hours. Much smaller doses, given at shorter intervals, yield better results.

The symptoms indicating the use of COLCHICUM homœo-

pathically are: dark-red swelling and heat of the great toe-joint, with excessive sensitiveness to touch, violent tearing or sharp sticking pains, with extreme soreness in the toe, heel, and small joints. Sensitiveness to strong odors of any kind; he craves a certain article of food, but when it is brought him, the sight and the smell of it nauseate him, and he refuses to take it. Mental irritability and peevishness. Great prostration. Urine dark and scanty (but the excretion of urea or uric acid is not modified). The powerful action of COLCHICUM upon the gastrointestinal canal, with violent retching and vomiting of food and bile, coldness of the stomach and jelly-like dysenteric stools, accompanied with great tenesmus and prostration, recommend its use when such symptoms occur from sudden retrocession or suppression of gout. The heart symptoms of the drug are also well-defined (anxiety, pressure, tearing pain and stitching in the præcordial region; great oppression and difficulty of breathing; weak and indistinct action of the heart; thready pulse, etc.), often call for its exhibition when cardiac complications arise.—ARNICA: painful, hard, shining swelling of the affected part. Great sensitiveness of the body. "The bed feels too hard." Excessive prostration. "Fear of persons coming toward him, as if they would strike him." (T. F. Allen.)—BENZOIC ACID is credited with causing symptoms of a uric acid diathesis, with swelling of the joints and pains in the joints and tendons of a sticking, burning, tearing, stitching character. The urine is dark-brown, acid, very offensive, and of high specific gravity.—LEDUM is indicated in rheumatic rather than gouty affections, but its provings yield many symptoms in the small joints which closely resemble gout. The pains are drawing, tearing, grinding and, if rheumatic, shifting. They are made much worse from the warmth of the bed.—LITHIUM CARBON. "Is generally indicated in a gouty diathesis, with recurring attacks of acute inflammation of the small joints or of the heart. The skin of the LITHIUM patient is very rough and dry."—LYCOPodium is undoubtedly one of our best remedies in the treatment of the lithæmic state. Its use rests upon the presence of familiar indications, as the acid, atonic dyspepsia and hepatic symptoms which so closely resemble the digestive disturbances peculiar to lithæmia; it also covers respiratory symptoms which are frequently present. Chronic

gout, with chalky deposits in the joints; eczematous and herpetic eruptions.—*SABINA*. “The great toe is hot, swollen, red, and extremely painful, with aggravations at the least touch or motion, and with some relief from cold applications. High fever, worse in the evening. Heaviness in the affected limb. Frequent change in position to obtain some alleviation.” The open air feels grateful; general depression; pulsations in different blood-vessels.—*NUX VOMICA* is often called for by symptoms of gastro-intestinal derangement; it may prove of benefit in an acute attack of gout occurring as the direct result of gormandizing and too free indulgence in stimulants. Irritability of temper is especially marked.—*GUAIACUM* has been used of late for gout, though much closer related to chronic rheumatic arthritis. H. C. Houghton reports a case of “gouty otitis” cured under its exhibition, but the value of the report is impaired by the use of intercurrents. It is said to act best when the left side is affected.—The exhibition of *ACONITE* and *BRYONIA* during the early stage, of *VERATRUM VIRIDE* (great arterial tension, high temperature), *CHINA*, *TEREBINTHINA* (nephritic complications; dark, cloudy urine with dirty pink sediment) and *PLUMBUM* (contracted kidney) is justified by the presence of their well-known characteristics.

DIABETES MELLITUS.

Diabetes mellitus or saccharine diabetes is a disorder of nutrition characterized by the persistent accumulation of sugar in the blood, which is excreted from the system through the urine. The constitutional symptoms are: inordinate thirst, ravenous hunger, copious emissions of saccharine urine and progressive wasting of the body, with great exhaustion. The disease almost invariably terminates fatally.

Ætiology.—*Heredity* is an important factor. Purdy states that in 30 per cent. of all cases the predisposition to diabetes is inherited, and both Ralfe and Sir H. Marsh have furnished instances of its appearing through four successive generations; in a very large number of cases the neurotic temperament was well pronounced. Nearly two-thirds of the cases occurred in

males, especially in persons from the third to the sixth decade of life. Cases of young infants suffering from diabetes have been reported, but they are as exceptional as those which first declare themselves during old age. The disease has a preference for a cold climate and high altitude, and is oftener seen in the city than in the country. Hebrews are strangely subject to it, Frerichs stating that one-fourth of all his cases belonged to that race. The higher classes of society furnish a large per cent. of the victims. Sudden obesity has been observed to precede diabetes. The affection is oftener seen in Europe than in America, statistics showing that whereas, according to the last census, in America there were 2.8 cases to each 100,000 population, from 5 to 9 were reported in Europe.

Of exciting causes, serious impairment of the nervous system by shock, overwork, the strain of great responsibility, anxiety and worry are among the most important, particularly when associated with close confinement and high living. A disordered nutrition, from careless eating or from overeating, beyond doubt often excites a latent tendency to diabetes, and to this cause is assigned its frequency among the Jews. Cases have been traced to *injuries* of the *brain* and *spinal cord*, especially, but not necessarily, those involving the medulla oblongata (as blows and falls upon the forehead, vertex or occiput), and to irritative lesions of Bernard's diabetic centre. Gout, malaria and syphilis are by some authors associated with diabetes. Exhausting and particularly infectious diseases, by their depressing effects upon the nervous system, are at times followed by diabetes; for the same reason pregnancy and diabetes are often associated. Glycosuria, usually the result of overeating, especially of too free indulgence in starchy food, may call into action a latent predisposition to diabetes.

The real nature of diabetes is not understood. Purdy (1890), after a very thorough consideration of the theories and facts advanced, comes to these conclusions: "(a) That the essential feature of diabetes consists of a more or less profound disturbance of the glycogenic function of the liver. (b) That the chemico-physiological changes in diabetes result in arrest of the elaboration of certain foods in their course toward their ultimate destination in the organism,—probably as fats,—and the intermediate product, passing into the general circulation, es-

capas from the system, chiefly by way of the kidneys, in the form of sugar. (c) That the disease is accompanied by a hyperæmic condition of the liver and a more or less engorged state of the chylopoietic viscera. (d) That recently ascertained facts indicate that, in addition to the liver, the pancreas also is concerned in the production of sugar in the organism,—or, to speak more accurately, in preventing the production of sugar in the organism,—and consequently diseases of the latter organ are liable to induce diabetes. (e) That diabetes may be brought about by diseases which involve the central ganglia that preside over the vaso-motor nerves of the liver, by diseases affecting the peripheral distribution of these nerves, and probably also by disorders involving inhibitory reflex action of the sympathetic nervous system.”

During the last few years extensive inquiry has been made into the part played by affections of the pancreas in the production of diabetes, started by the frequency with which lesions of that organ have been observed in persons dead from diabetes. Experiments show that extirpation of the pancreas in dogs causes glycosuria (a patient of W. T. Bull died of diabetes after extirpation of the pancreas); but if the extirpation is incomplete, a small portion of the gland remaining, such result is not produced. “The pancreas, on this view, like the liver, has a double secretion—an external, which is poured into the intestines, and an internal, which is poured into the blood. The latter is supposed to be of the nature of a ferment, in the presence of which alone the normal assimilative processes can take place with the glycogen. Disease of the pancreas causes diabetes by preventing the formation of the glycolytic ferment.” (Osler.)

Morbid Anatomy.—The *nervous system* presents no lesions which may be considered characteristic. The *liver* often, but not always, is enlarged, sometimes slightly, again to two or three times its normal size; if enlarged, it is of dark color and of hard texture. “The essential and most constant changes found are marked dilatation of the hepatic capillaries, hyaline thickening of the walls of the latter, and slight interstitial overgrowth surrounding the hepatic cells, either individually or in clusters and extending along the walls of the interlobular plexuses. In addition to this, the vessels are distended and en-

larged; the liver-cells swollen, somewhat granular, and indistinct in their outlines, with diminished amount or absence of the normal fat contents." (Purdy.) The *heart* (left ventricle) is enlarged in about fifteen per cent. of the cases; fatty degeneration of the heart and of the arterial walls is common; dilatation is frequent; increased vascular tension is often observed during life. The *blood* contains a large amount of sugar (from $\frac{1}{4}$ to $\frac{1}{2}$ per cent., or more) and sufficient fat to give to it a more or less milky appearance. There is loss of solids, lessening of alkalinity, and increase in the proportion of water. The *lungs* frequently are involved in tuberculous processes or suffer from circumscribed areas of pneumonic inflammation, with hepatization and tendency to breaking-down of tissue and the formation of cavities. The *pancreas*, it is estimated, shows distinct changes in about one-half of the cases. Atrophy of the gland is the most common, the result of connective tissue changes or of obstruction of the ducts from calculi; cysts are occasionally formed from the latter cause. The *kidneys* suffer because of the large amount of work thrown upon them and from irritation caused by the presence of sugar. The organ is enlarged, over-filled with blood, and presents a smooth surface with non-adherent capsule. Hyaline changes take place in the tubular epithelium. The cells of the large medullary tubes become swollen, clear, and are recognized with difficulty (dropsical degeneration of Cantani).

Symptoms.—While exceptionally, as after the receipt of an injury or after some sudden and profound emotion, symptoms of diabetes may set in without warning and develop rapidly, in the great majority of cases the onset is stealthy, and the suspicions of the patient are not roused until large amounts of urine are secreted, with insatiable thirst, ravenous hunger, and progressive and usually rapid emaciation,—symptoms which practically constitute diabetes. The *urine* is pale, watery, of sweet odor, sweet taste, acid in reaction, and of high specific gravity, averaging from 1.025 to 1.045. The amount voided within the twenty-four hours varies from three or four quarts to several gallons in severe cases. It contains sugar ranging from one and a-half to two per cent. in mild cases to five, eight or even ten per cent. in severe cases, and has reached the enormous amount of one or two pounds in twenty-four hours. The

amount of urine passed is reduced under proper diet and by intercurrent acute (febrile) diseases. *Thirst* is constant and so violent that it cannot be quenched; in unusually bad cases it is agonizing. The large amount of water is needed to keep in solution the sugar and to facilitate its excretion. Thirst is worse after eating. In exceptional cases it is moderate throughout, with corresponding moderate excretion of urine. There is dryness of the mouth and lips, which is not relieved by drinking; dry, glazed tongue, and scantiness of the salivary flow. The *appetite* usually is voracious, especially in the early part of the case. Eventually, as the result of overtaxed digestion, loss of appetite may occur, with other symptoms of indigestion, such as *constipation* or diarrhoea, often accompanied with swelling and soreness of the gums and, later, aphthous stomatitis. *Emaciation* is marked and in proportion to the amount of sugar excreted. The *skin* becomes dry and harsh; the breath has the odor of rotten apples; the temperature is lowered, averaging from 96° to 97°, sometimes falling much lower; there is shivering and great sensitiveness to cold, with taking cold from slight exposure; the pulse is frequent, with increased tension in the majority of cases.

The case progressing, manifestations of exhaustion and irritability of the nervous system appear (somnolence, neuralgia, cramps, sensory derangements, as cutaneous hyperæsthesia, sensation of great heat, sudden sweating, etc.), with irritability, fretfulness, loss of sexual power, impairment of mental vigor, great bodily weakness and general apathy. Pulmonary and other complications, especially cardiac disturbances, now set in, with difficulty of breathing, præcordial distress, and death from general exhaustion, from some complication, as phthisis or gangrene, or from diabetic coma.

Various complications arise in the course of the disease and materially modify the clinical picture presented. Of these, the *pulmonary* complications are among the most important; they consist of pneumonia of an acute character, lobar or lobular, tuberculous affections, and gangrene (less fetid than in the ordinary form). *Renal* complications are comparatively frequent, particularly albuminuria. Usually it is trifling, but in exceptional cases and late in the course of the disease it arises from structural implication of the kidney, and then is serious. It is

often met in connection with diabetic phthisis, occasionally with arterio-sclerosis, and sometimes it precedes diabetic coma. *Cutaneous* affections are a source of great annoyance and even danger. Eczema, accompanied with terrible itching, is common. Intense irritation of the genito-urinary mucous membrane (pruritus pudendi, balanitis) causes much distress. Boils and carbuncles are frequent and often constitute a serious feature of a case, giving rise to much pain and exhaustion. Gangrene, also, is not uncommon. The *nervous* disturbances are varied. Many of them are due to the irritability of weakness, as the numbness, tingling, muscular weakness and neuralgia in different parts of the body. *Peripheral neuritis* often occurs, giving rise to neuralgia (symmetrical), especially of the sciatic nerve; trophic disturbances are liable to result from the same cause, such as loss of hair and nails, and even perforating ulcers. The paraplegia, occasionally quite extensive and even affecting both arms and legs, and the minor transitory paralysees seen, are probably due to neuritis. The so-called diabetic tabes (pseudo-tabes), differentiated from true tabes by the rapidity of its development and its prompt subsidence when there is improvement in the diabetic condition, is accompanied by impairment or loss of the patellar and other tendon-reflexes, lightning-pains in the legs, and characteristic gait. When diabetes is the result of irritation or disease of the fourth ventricle, the patellar reflex is liable to be exaggerated. The *mental* condition is one, usually, of great depression; commonly there is loss of sexual power. Of the *special senses* the organs of vision and of hearing are affected in the greater number of cases. It is stated that nearly all the paralytic and inflammatory diseases of the eye may occur in connection with diabetes, as cataract, retinitis, hæmorrhages, sudden amaurosis, paralysis of the muscles of accommodation and atrophy of the optic nerve. Of aural affections, otitis media is the most common; inflammation of the mastoid cells is occasionally seen. Impairment of the sense of taste or of smell is rare. *Diabetic coma* is the most important and serious complication, about one-half, if not more, of all cases of diabetes terminating in coma. It has been extensively studied by Kuessmaul, Frerichs, and others, but its nature is not yet understood. The weight of testimony tends to show that it is due to some poisonous substance in the

blood, probably acetone. Frerichs distinguishes three forms: cases in which weakness, syncope, somnolence and coma develop within the course of a few hours, after a violent exertion; cases in which there is some local affection (as pharyngitis, carbuncles) or a pulmonary complication, or preliminary gastric derangement, with headache, delirium, dyspnoea, intense difficulty of breathing (Kuessmaul: "Luft-hunger"), rapid and weak pulse, gradually developing fatal coma in from one to five days; and cases where the patient without warning is suddenly seized with headache and feeling of intoxication, rapidly drifting into profound coma. It is stated that there is great danger of coma whenever the quantity of urine is suddenly diminished without a corresponding reduction in the relative amount of sugar.

Duration and Prognosis.—The age of the patient at the time diabetes first appears is of great importance, since observation shows that the older the patient at the time the first symptoms appear, the more tedious the progress of the disease. In young children the disease runs a rapidly fatal course, from a few weeks to a few months. In young people, shortly before the age of puberty, the duration is rarely more than two years. In elderly persons, with tendency to obesity and arthritic rheumatism, the duration is from fifteen to thirty years, unless accompanied with pancreatic disease; if the pancreas is involved, death is liable to occur within two years. Pregnancy in a diabetic patient is a serious complication. Abortion takes place in one-third of such cases, and delivery in one-half of them is followed by coma or grave pulmonary symptoms. Diabetes suddenly appearing in a person of rugged health is liable to run a rapid course to a fatal termination. If the result of an injury, the prognosis is favorable if the disease appears at once, such cases often recovering in a few months; if the first symptoms do not appear until a considerable period of time has elapsed, the prognosis is grave. Heredity always adds to the gravity of the situation. In fact, it is generally admitted that the disease is practically incurable.

Diagnosis.—The diagnosis rests upon the constant presence of sugar in the urine, and is so clear that a mistake cannot readily be made. The following tests are easily made and reliable:

Trommer's Test.—Treat one drachm of the urine with sufficient cupric-sulphate solution to render it of light-green color, then add an equal volume of liquor potassæ. At first a blue precipitate of hydrated cupric protoxide results, which dissolves upon shaking, forming a clear, blue solution. If allowed to stand about half an hour, there will be a precipitation of yellow or yellowish-red suboxide of copper. The application of gentle heat, instead of standing, renders the test more delicate, and precipitation occurs at once; but the solution must not be boiled long, lest the test be rendered oversensitive.

Fehling's Test is easily made and reliable, provided the solution is made fresh. The original formula is: 34,639 grammes of pure crystallized cupric sulphate; solution of sodium hydroxid (spec. gravity, 1.12), about 500 cubic centimetres; chemically pure neutral sodium tartrate, 173 grammes. Dissolve the copper sulphate in 100 cubic centimetres of distilled water; next dissolve the neutral sodium tartrate in the caustic-sodium solution, and add the copper solution little by little; then, with distilled water bring the volume of the whole to 1000 cubic centimetres. Apply as follows: dilute one drachm with an equal bulk of distilled water in a test tube, and gently boil for a few seconds. If it remain clear, add the suspected urine, drop by drop, and if sugar be present, the first few drops will usually cause a yellow precipitate. If no precipitate occur, continue dropping until one drachm, not more, of urine be added, reapplying the heat occasionally. If no precipitate occur, sugar is, clinically speaking, absent.

Haine's Test.—Take pure copper sulphate, 30 grs.; distilled water, $\frac{1}{2}$ oz.; make a perfect solution and add of pure glycerine, $\frac{1}{2}$ oz.; mix thoroughly and add 5 oz. of liquor potassæ. Apply as follows: gently boil one drachm of this solution in an ordinary test-tube. Add, not to exceed, 6 to 8 drops of the suspected urine, and again boil gently. A copious yellow or yellowish-red precipitate will be thrown down if sugar be present. This test is easily made, and the fluid remains reliable for an indefinite time.

The *Fermentation Test* will detect sugar if present in considerable quantity, not less than one per cent., but it requires several hours. "Fill an ordinary test-tube half full of mercury and the remaining half of the urine to be tested, and introduce into

the urine a small piece of German yeast. Next close the mouth of the test-tube with the thumb and invert over a small vessel of mercury, and set aside in a warm room for several hours. If sugar be present, fermentation will occur at once, liberating the carbonic acid gas which collects in the upper end of the tube, displacing the urine and mercury more or less, according to the quantity of sugar present. One precaution should be observed. Some specimens of yeast spontaneously evolve gas, and it is, therefore, best to perform a parallel experiment with yeast mixed with water, so that the spontaneously evolved gas may be estimated." (Purdy, Practical Urinalysis, 1894.)

Treatment.—Personal hygiene must be carefully enforced, including a moderately active out-of-door life in an equable climate, the use of proper underwear, abstinence from everything liable to create much bodily fatigue or mental strain, and a bath at least every other day, lukewarm or cold, according to the strength of the patient. "Chilling" must be carefully avoided.

Diet is of prime importance. Sugar and starch must be excluded, and fruits and vegetables which are rich in them are strictly prohibited. Saccharine, if tolerated, or glycerine may be substituted for sugar. Drinks and beverages containing sugar, as champagne, lemonade, cider, ginger ale, aerated drinks, etc., are positively forbidden. Milk, unless skimmed, is also under the ban, and even skimmed milk, recently so popular, is now considered injurious. *Water* should be used freely, especially alkaline waters, as Vichy, Londonderry lithia, Apollinaris, Waukesha, etc.; the ready elimination of sugar demands it, and if the patient is denied it, the tissues will suffer correspondingly. Tea and coffee may be used, but without sugar. Bread is highly objectionable, but it is difficult to find a satisfactory substitute for it, a majority of the biscuits and breads for diabetics being utterly without merit. Almond flour has been tried, but bread made from it is heavy and indigestible. Bread made from gluten flour is open to the same objections; it frequently contains a large percentage (35 to 40, and more) of starch, and soon becomes very distasteful to the patient. In the majority of cases it is absolutely necessary to allow a few ounces of bread daily. The following, from Hare, is a good recipe for gluten bread: take one quart of sweet milk or milk-and-water, one heaping teaspoonful of good butter, one-fifth of

a cake of compressed yeast beaten up with a little water, and two eggs well beaten. Stir in the gluten flour until a soft dough is formed, knead as in making ordinary bread, put in pans to raise, and when light, bake in a hot oven.—Potato may be used in moderation.

The physician must not be arbitrary in making up the dietary or inconsiderate of reasonable demands on part of the patient. The needs of each case must be studied and met; sudden radical change is to be avoided and a policy of gradual restriction adopted, removing, one by one, from the dietary such articles of food as are especially injurious, with a return to a more liberal diet when this is justified by improvement, always avoiding carbo-hydrates and encouraging the use of meats.

The various dietaries suggested are, of course, complicated, and many contain articles largely beyond the reach of persons of moderate income. Generally speaking, the following list will be found useful:

Forbidden: All starchy foods, sugar, potatoes and bread, save as taken with advice of the physician. Rice, tapioca, arrow-root, sago, groats, beans, peas, lentils, chestnuts, turnips, radishes, and all sweet and dried fruits.

Allowed in any quantity: Meat (fresh and smoked), tongue, ham, bacon, fish, oysters and shell-fish, crabs and lobsters. Animal jellies. Eggs, caviare, cheese, butter, pure cream. Spinach and cooked salads. Cucumbers, green asparagus, water-cress, sorrell, mushrooms, olives, nuts.

Cauliflower, carrots, cabbage, green beans and berries may be used in small quantities. Of beverages, in addition to those mentioned, liquors, ices, sorbets, cocoa and chocolate are absolutely forbidden. Light sour wines may be used freely; unsweetened lemonade may be drunk in small quantities.

Medicinal treatment is unsatisfactory. Opium is considered capable of limiting the progress of the disease, and is given in the form of morphia, from four to six grains in the twenty-four hours. Diabetic patients not only tolerate large amounts of this drug, but do not appear to suffer when it is temporarily withdrawn, as it should be when there is an improvement of the general condition. Codein has been used as a substitute, in the same dose, but morphia is preferred. Complications must be treated according to the indications present. For the

tormenting eczema and pruritus Osler recommends lotions of boric acid or hyposulphite of soda, one ounce to a quart of water. Diabetic coma has, so far, proved beyond the reach of treatment. Neither inhalations of oxygen nor intravenous injections of saline solutions (three per cent. solution of sodium bicarbonate) have proved of more than slight temporary benefit.

Homœopathic literature furnishes proof that the indicated remedy may relieve many symptoms and prolong life; some cures are also related; but the result of treatment is not satisfactory. Of the long list of remedies which have been recommended from time to time, few have proved of any value. The following are the most reliable: ARSENIC, AURUM, BROMIDE OF ARSENIC, CREOSOTE, IODINE, LYCOPodium, PHOSPHORIC ACID, PHOSPHORUS, PLUMBUM, SYZYGIUM, STRYCHNINE, URANIUM NITRATE.

URANIUM NITRATE has been in use since Lecomte (1857) stated that dogs poisoned with small doses of it void saccharine urine; instances of permanent improvement under its exhibition are given by reliable reporters. It seems to be especially useful in cases with derangement of digestion and assimilation. It has proved of service in the diabetes of pregnancy. The symptoms which indicate it are: dyspepsia, enormous appetite and thirst, great abdominal distension, exhaustion and debility, coldness of the body, and evidence of pancreatic involvement. The most satisfactory results have been produced by the mother tincture in material doses and by the low attenuations (1x and 2x).—PHOSPHORIC ACID corresponds to the "nervous" type. The introduction of phosphorus into the system is followed by the excretion of saccharine urine, and the drug is closely related to those conditions of great nervous depression, grief, worry, etc., which figure among the important ætiological factors of diabetes. "Urine like milk, mixed with jelly-like bloody mucus, or clear, like water; pain in the back and region of the kidneys; sleeplessness; excessive emaciation; great prostration;" flaccidity of the genital organs; sexual appetite gone, or weak and premature emissions, followed by great prostration; after the loss of animal fluids, fast living, grief, disappointments, etc.—ARSENIC is not used as often as its merits deserve. Its action upon the liver, seriously interfering with its glycogenic function, and upon the kidneys has led to its occasional and

reasonably successful exhibition. Its restlessness, anæmia, profound prostration, melancholia (accompanied with nervous tension), albuminuria, dryness of the skin, scaly, scurfy eruptions, carbuncles with shooting, burning pain, neuralgic affections (sciatica),—all these are symptoms of frequent occurrence in diabetes. In gangrenous conditions, such as may occur here, it needs to be carefully considered. In three cases under my observation the remedy did excellent work; one of the patients is still living, and is actively engaged in business, apparently well. The liquor arsen. brom. is a favorite prescription with some physicians; Hale recommends the arsenite of iron (2x trituration) when there is anæmia or malarial cachexia; he also cites Purdy, who claims good results from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain. Of late a combination of arsen. brom. with gold has been much employed.—PHOSPHORUS is suggested by its close relation to the pancreas, liver, kidneys and lungs, and by its power to set up a general neuritis. There is great exhaustion of body and mind, with irritability of the nervous system. The urine is milky white, containing fatty casts. There is burning heat in the stomach, extending to the back, with faintness and a sense of emptiness in the stomach and bowels; atonic dyspepsia; relief of gastric symptoms from drinking cold water, with subsequent aggravation, even to vomiting, as soon as the water has become warm in the stomach. Pulmonary complications.—PLUMBUM is of service when there is albuminuria. Periodic attacks of vomiting food, with gastralgia and enteralgia, relieved by hard pressure.—IODINE is an important remedy in affections of the pancreas, and is occasionally useful here when pancreatic symptoms are prominent, even though it does not completely cover the urinary symptoms. It has the ravenous, insatiable hunger, with progressive, extreme emaciation in spite of the large amount of food taken; despondency, great peevishness and irritability; fat in the stools; skin dry, brown, rough. "Scrawny" appearance of the patient. Pulmonary involvement with characteristic symptoms.

Among other remedies which have been found serviceable are: SYZYGIUM, which at one time was used extensively and, it seemed, with good results, in doses of from three or five to thirty grains of the pulverized seeds three times per day. More recent experience has shown that it is not reliable in its action,

and that large doses may greatly lessen the amount of urine without diminishing the amount of sugar.—KREASOTUM, according to Hale, is credited with some cures that seem permanent. "I very nearly cured a case with ten drops of the first, four times a day. The sugar was reduced to five grains to the ounce, when the patient left the city and has not reported since."—ASCLEPIAS VINETOXICUM is said to have caused in sheep fed upon it a form of diuresis with violent thirst, and to have greatly reduced in a number of diabetics the sugar present in the urine. Consult also: RHUS AROMAT., SODIUM SALICYLATE, TEREBINTHINA, LYCOPODIUM, LEPTANDRA, IRIS, PODOPHYLLUM, NUX VOMICA, ARNICA, and NATRUM SULPHURICUM.

Rockwell reports marked benefit derived in one case, complicated with locomotor ataxia, from general faradization alternated with central galvanization.

DIABETES INSIPIDUS.

Diabetes insipidus, also known as polyuria, hydruria, polydipsia, hyperuresis, is a constitutional disease characterized by passages of large quantities of non-saccharine urine of low specific gravity.

Ætiology.—It occurs oftenest in persons in early life, from the tenth to the twenty-fifth year, and rarely after middle life; it is less frequently seen in young children, and only exceptionally in those of advanced years. It is more common in persons of the male sex than in females. *Heredity* is an active factor; the affection has been observed for three and four generations in the same family, at times alternating with saccharine diabetes. Its most fruitful cause seems to be a *violent shock* to the *nervous system*, as a severe fright or an overwhelming emotion, intoxication with alcohol (or lead), traumatism (head, trunk, limbs), sunstroke, etc. Occasionally it occurs during convalescence from a severe fever or other acute illness, or in connection with cerebral affections (tumors of the brain, lesions of the medulla, tubercular meningitis, paralysis of the sixth nerve), or with serious abdominal diseases, such as abdominal tumors (Dickin-

son), abdominal aneurism (Ralfe), or tuberculous peritonitis (Osler).

The essential nature of the disease is unknown. It probably is of nervous origin, vaso-motor disturbances of the renal vessels resulting from nervous influence. There are no characteristic anatomical changes.

Symptoms.—The development of polyuria may be rapid in cases which arise from fright, violent agitation, or powerfully acting moral cause. Usually it develops slowly. The chief symptoms consist of the *frequent emission of large amounts of urine*, varying from 15 or 20 to 40 pints daily, of low specific gravity (1.001 to 1.005), watery, colorless, of acid reaction when fresh, but neutral or alkaline after standing. The relative amount of solids in the urine is lessened, but the sum total of solids passed during the twenty-four hours is materially increased. *Thirst* naturally keeps step with the amount of liquid passed off. There is scanty secretion of saliva, great dryness of the mouth, the tongue becomes red and glazed, and occasionally a fall of the bodily temperature below normal. The appetite in many cases remains good, digestion and assimilation active, and the patient appears and feels well and hearty. In more serious cases the digestion becomes deranged, and headache, dizziness, emaciation, loss of physical and mental energy, with various nervous disturbances, are experienced, the condition in some instances bearing a close resemblance to saccharine diabetes. When polyuria occurs during childhood, it is liable to interfere with proper growth and development of the little patient. Pulmonary affections, paralysis of the sixth and other cranial nerves, loss of reflexes and diseases of the eye (retinal hæmorrhage, neuro-retinitis, atrophy of the optic nerve) constitute complications in grave and advanced cases.

The *course* of diabetes insipidus depends somewhat upon the nature of the cause. If idiopathic, it may run on indefinitely, death eventually occurring from some intercurrent malady or, much more rarely, a cure taking place spontaneously. If resulting from a deep-seated or organic disease, we find the grave manifestations already described, with death usually from exhaustion, convulsions and coma, or from pulmonary complications. In these serious cases there is a loss of urates as the digestive powers become impaired. At intervals, sugar may be

found in the urine; traces of albumin may be detected; urates and oxalates may be present in large amounts, especially in children and young persons; an excess of phosphates accompanies disturbances in the nervous system and pulmonary complications.

Diagnosis.—The diagnosis from *saccharine diabetes* rests upon the absence of sugar from the urine, its low specific gravity, and the character of the constitutional symptoms. The polyuria of *hysteria* may be recognized by the history of the case, the transient character of the urinary symptoms, and the nature of the concomitants.

Treatment.—The general treatment consists of such measures as will place the patient in the best possible hygienic surroundings. No particular restrictions as to diet are necessary, save abstinence from such articles of food as have proved deleterious. Water may be drunk *ad libitum*; possible benefits from limiting the amount of drink taken are more than offset by the resulting tormenting thirst and the annoyance arising from it. Acidulated drinks are especially grateful. Hot baths and frequent rubbing are beneficial; the electric current (galvanism) may prove advantageous. Antipyrine (fifteen grains every four hours) has become a standard remedy; valerian in large doses (one ounce of the extract, in divided doses, during the twenty-four hours) and ergot (one-half drachm to one drachm of the fluid extract three or four times daily) are highly recommended by leading clinicians of the dominant school.

PHOSPHORIC ACID is of great service in those exhausted conditions of the nervous system to which reference has been made in the preceding chapter. The urine often is thick and milky, and there is frequently copious and persistent diarrhoea, which, however, does not exhaust the patient.—NATRUM MURIATICUM. Copious emissions of pale, limpid urine; great thirst, despondency, physical and mental exhaustion, anæmia, marasmus. Weakness and sinking at the stomach. Involuntary emission of urine from sneezing or coughing. Violent palpitation of the heart, shaking the whole body. Paralytic tendency. Characteristic eruptions with much itching and smarting, with acrid, irritating discharges and formation of crusts.—HELONIAS. Large quantities of clear, light-colored urine of low specific gravity, with much debility and emaciation. Constant aching

and tenderness over the kidneys. Languor, drowsiness.—*SECALE*, by the dominant school, is given for its physiological effects. Its use, homœopathically, is suggested by great nervous exhaustion, with tendency to numbness, anæsthesia, paralysis, or to gangrenous affections. Internal heat and external coldness, with unwillingness to be covered; restlessness; desire for sour drinks; severe watery, gushing diarrhœa.—*SCILLA* has been highly recommended, especially by Hughes. Its provers experienced interesting urinary symptoms, as: inability to retain the urine because the amount was too large; it would have been passed involuntarily if he had not hastened. Waking at night to urinate. Urine as clear as water.—*IODUM*, with the indications given under saccharine diabetes. Pulmonary complications.

Taking into consideration the probably nervous origin of the disease, it is evident that among the important remedies must be placed *IGNATIA*, *VALERIANA*, *ZINCUM VALERIANICUM*, *AURUM*, *PULSATILLA*, and others of the same class, their exhibition depending not so much upon the urinary symptoms presented as upon the general characteristics of the case. In the same manner *ARNICA* may be suggested by traumatic origin of the affection. *RHUS AROMATICA*, *CAUSTICUM*, *GLONOINE*, *TEREBINTHINA* and *APIS* should also be studied.

RICKETS.

A disease of infancy, characterized by impaired nutrition and alterations of the growing bone (excessive proliferation and deficient calcification), accompanied with general constitutional weakness, anæmia, laxity and weakness of the muscles, great susceptibility to catarrhal inflammation of the respiratory and gastro-intestinal mucous membrane, and pronounced reflex irritability with tendency to laryngismus and tetany.

Ætiology.—The essential cause of rickets is not known. It occurs oftenest in large cities among the children of the poor, who live in poverty and filth, and suffering from the lack of sunshine, fresh air and proper food. It is very common in European countries, and until recently had been thought rather

infrequent in America. Continued excessive immigration and the rapid growth of American cities, with their attendant evils, have rendered the disease much more common than formerly in this country, as abundantly proved by reports from public hospitals and dispensaries in the large American towns. The negro race are said to be especially liable to rickets.

Among the well-to-do, rachitis is seen chiefly in children who have been kept too long at the mother's breast or who have been fed on artificial food containing an excess of starch and a deficiency of fat.

The disease occurs in early infancy. J. Lewis Smith shows that out of a total of 903 cases of rickets, 99 occurred during the first half year of life; 259 during the second half year; 342 during the second year; 134 during the third year; 31 during the fourth year; 17 during the fifth year; 21 between the fifth and ninth year.

Predisposing causes consist of any influence exerted upon the child in utero or after birth which enfeebles digestion and assimilation or materially weakens the general tone of the system. Thus, children suckled during pregnancy of the mother, or breast-fed when the mother's milk has ceased to be nourishing, or who inherit tubercular or syphilitic taint, or whose vitality is lowered from any other cause, frequently become rickety. Occasionally, new-born children bear all the marks of the disease; they are still-born or die soon after birth.

Morbid Anatomy.—The bones of the body undergo remarkable changes, especially noticeable at the epiphyses of the long bones and at the ribs. The seat of the affection is the proliferating zone of the long bones, which in the normal bone is very thin, consisting of a "scarcely perceptible layer of a reddish-gray color upon the end of the shaft." In rickets this zone consists of many layers; cell proliferation is maintained at an excessive rate, and the proliferating zone itself appears as a soft, grayish, translucent cushion, with corresponding enlargement of the part. With these changes the formation of bone is arrested or made abnormal, lacking in both natural rapidity of development and firmness of texture. Chemically, there is a great deficiency in lime-salts.

The poverty of earthy matter renders the bone soft and easily yielding to pressure, hence the curvature of long bones in

rickets from inability to sustain the weight of the body. Other manifestations of morbid action here are the "rachitic rosary," due to the swelling of the anterior ends of the ribs; craniotabes or thinning and softening of the cranial bones; affections of the vertebræ, resulting in spinal curvature; deformities of the pelvis, etc.

Eventually, reparative processes take place. Pressure upon the enlarged portions of bone by the tightly drawn periosteum gradually lessens the hyperæmia and exudation, while new matter, rich in lime salts, is deposited in the concavities and forms exceedingly hard layers of osseous formation, resembling tooth-enamel and usually described as "eburnation." The hyperæmia constantly lessening, the proliferation process eventually becomes normal, the texture of the bone permanently increases in firmness, the soft parts regain their vigor, and more or less complete recovery takes place. Enlargement of the liver and spleen as the result of cell proliferation has been observed in from 30 to 35 per cent. of cases examined after death.

Symptoms.—The first symptoms of trouble usually occur during the period of dentition. The child "droops," becomes irritable and cross, and restless both day and night. Digestion is deranged. Appetite is fitful, often craving; there is vomiting, diarrhœa of sour, undigested stools, or constipation; sometimes periods of diarrhœa alternate with constipation. The little patient is more or less feverish; he shows an unwillingness to exert himself or even to be handled, and it is readily seen that every touch of the body, whether on bony structure or soft parts, causes suffering. At night he sweats profusely about the head and neck, often completely soaking the pillow. Usually this condition is accompanied by considerable loss of flesh; but often a reasonable degree of plumpness of the body is preserved. If the child is old enough to walk, the soreness of the body from touch or motion makes him desist; he prefers to lie quiet, and if he undertakes to move at all, it is done feebly and with unsteadiness of motion. As the case progresses, the soft tissues become more and more flabby, the skin grows pale and often is covered with miliaria, and the lack of power in the extremities may be sufficient to excite fears of paralysis.

In the meantime, the characteristic bone lesions have begun, with swelling about the epiphyses of the long bones, generally

first noticed about the wrist. Nodules, which may readily be felt and seen, are formed at the junction of the bone and cartilage, in the ribs giving rise to the rachitic rosary, a symptom which does not appear until after the third month, gradually increases up to the second year, and disappears during the fourth year. The shape of the thorax is affected by the softening of the ribs, forming the so-called "pigeon-breast," the result of abrupt bending of the ribs, chiefly from atmospheric pressure during respiration, lessening of the transverse diameter of the anterior half of the chest, and subsequent marked prominence of the sternum, particularly in its lower half. "Harrison's groove" is a transverse curve from the level of the ensiform cartilage toward the axilla. Breathing becomes somewhat abnormal in that there is a considerable sinking of the chest on each side during inspiration. These changes naturally affect the integrity of the lung, and, owing to the susceptibility of the respiratory mucous membrane, there is in all these cases a great liability to bronchitis and bronchopneumonia. Curvature of the spine, usually antero-posterior, sometimes lateral, is common; it is due to the weight of the head and shoulders upon the softened vertebræ. In some severe cases the vertebræ are not involved and there is no curvature. The shape of the head is abnormal in a majority of cases. It usually presents a square shape (*caput quadratum*; *tête carrée*), and appears very large in proportion to the upper portion of the body and neck, the result of thickening of the frontal bone, causing protrusion of the forehead, and of the parietal eminences. The fontanelles remain open for a long time, sometimes as late as the fourth year, and there is thinning of portions of the skull, which is due to softness of the bone, to pressure of the brain from within and of the pillow from without. To this condition the term *craniotabes* is applied. *Craniotabes* is oftenest found in quite young children, less than one year of age, and is seen in the occipital and posterior half of the parietal bones. There may be mere thinning of the bone or complete absorption over a considerable area. In examining for *craniotabes* pressure should be applied away from the sutures and should be made with care, so as not to injure the underlying, sensitive brain substance. It must also be remembered that neither *craniotabes* nor the disfigurement of the thorax are in

themselves positive evidence of rickets. The former may occur in inherited syphilis, and the changes in the thorax may be caused by any condition which prevents the free entrance of air into the lungs. The bones of the face are often stunted; the lower maxillary bones may assume a polygonal shape, with an inclination forward of the alveoli and softening, lengthening of the upper maxillary from the zygomatic arch forward, thus changing not only the shape of the arch, but the position of the teeth, so that the latter no longer properly antagonize each other. Dentition is late in appearance, and the teeth usually are small and badly formed. In the bones of the upper limbs the changes which take place are less pronounced than in the legs, since the arms support less weight, except as the patient, in crawling about on the floor, may get the habit of sustaining himself by the upper limbs. Swelling of the lower end of the radius is, however, one of the earliest signs of rachitis, and both radius and ulna may be bent and twisted. The humerus may be bent from the action of the deltoid muscle. The clavicle may be thickened, usually at its sternal end; the scapulæ are occasionally thickened at the margins. In the legs the curvatures are more pronounced than in the arms because of the great weight which they are called upon to support. Enlargement of the tibia at its lower end appears early; in severe forms its upper extremity and the fibula and femur are also involved. The kind of curvature induced varies greatly; sometimes it is extreme, J. Lewis Smith citing "an anterior curvature so abrupt that an angle of 70° was formed about five inches above each ankle." Affections of the bones of the pelvis are very serious when they occur in girls; narrowing of the outlet of the pelvis is usually produced, thus, later in life, giving rise to grave complications during labor.

While these changes are taking place in the osseous system, the child continues to suffer from restlessness, feverishness, tendency to sweat, especially about the head, and perseveres in its unwillingness to sleep under cover during the night, regardless of the temperature of the room.

The soreness and tenderness to touch all over the body grow worse rather than better. Indigestion persists, with periods of diarrhœa or constipation. The child refuses to make use of arms or legs, and seeks to rest quietly on the pillow in the most

comfortable position. If craniotabes be present, it prefers to be held so the head rests over the shoulder of the nurse, by this means avoiding pressure upon the brain which disturbs the cerebral circulation and causes pain, irritation and restlessness. The possibility of more serious trouble in cases where by the existence of extensive craniotabes the brain is deprived of its natural protection is, of course, evident. The close relation, for instance, between this condition and dangerous spasm of the glottis has been amply demonstrated; the peculiar habit of such patients of "holding their breath" until the attendants are thoroughly alarmed is also of neurotic origin. On the other hand, it is a noteworthy fact that the intellectual activity of these children is very marked, probably because of the freedom of the brain from restriction from without. Many rickety children display a surprising degree of brightness, and it is on this account, and the often resulting dwarfed growth, that this class of persons furnished a majority of the jesters and court fools of medieval times.

Eclampsia sometimes occurs during the course of the disease, and tetany is occasionally seen. These often depend upon gastro-intestinal or respiratory catarrh or intestinal irritation; exceptionally they are of purely nervous origin. Great abdominal enlargement is frequently found, due to flatulent distension and to enlargement of the liver and spleen; the shape of the thorax increases the impression of excessive abdominal protuberance.

Diagnosis.—The diagnosis of rickets should not be difficult. Jenner attached especial importance to the general soreness and tenderness to touch which creates the desire to remain still; to the tendency at night to throw off the bed covering, and to the copious sweating of head and neck, soaking the pillow.

Prognosis.—The prognosis is good, as to life. In almost all cases partial recovery takes place, save as complications, such as bronchitis, broncho-pneumonia, laryngismus stridulus or convulsions suddenly cause a fatal termination. However, a certain arrest of normal growth, even after recovery from the rachitis, is a common feature, often leaving the victim of the disease much below the average stature. This is said to apply with particular force to cases beginning at a very early period of infancy.

Treatment.—With a full understanding of the conditions most unfavorably affecting pre-natal life, the intelligent physician will do all in his power to insure the best possible health on part of the pregnant mother, thus protecting both mother and child. The double drain of “carrying” one child and suckling another must be avoided, and the mischief resulting from rapidly repeated pregnancies will be lessened by extra care in providing rest, sunshine, open air, healthful surroundings, and an abundance of good food to the mother and, in due time, to the child. These precautions are truly prophylactic.

As soon as symptoms of rachitis show themselves in the young child, energetic measures must be taken to arrest the disease, and intelligent treatment here often proves surprisingly successful. The first and chief thing to be done is to provide suitable diet. If the child is at the mother’s breast, the appearance of rickets is strongly presumptive proof that the mother’s milk is deficient, and a good wet-nurse should be provided at once or cow’s milk be substituted. If neither agree, artificial food must be tried. To provide suitable food is not only of the last importance, but, as physicians realize, is at times a task demanding great patience, close observation, and good judgment. Generally speaking, farinaceous substances are to be avoided and fats supplied with liberality. The stools must be watched closely, and whenever they show evidence of indigestion, or vomiting is at all persistent, a change must be made, the physician feeling his way until he has by actual trial determined what best agrees with the child. In the majority of cases, cow’s milk, properly diluted, is to be preferred to artificial foods. The addition of barley-water or well-strained oatmeal gruel is to be recommended. Fresh beef-juice or scraped lean meat often acts well.

Bathing in tepid water is important and should be practiced daily, provided due care be taken not to have the child handled roughly nor allow it to take cold. Rickety children are sensitive and do not always react well; hence the room in which the bath is given should be absolutely free from draughts and kept at a temperature of not less than 75°. A daily sponge bath, gently administered, is helpful. The child must be held in the lap of the nurse, on a rubber sheet protected by a soft dry woolen blanket, the bath being given quickly and followed by

gentle friction. Daily bathing in olive oil or cod-liver oil is also very serviceable, and often indispensable. The importance of proper clothing, of keeping the feet warm, of maintaining absolute cleanliness, and of spending as much time as possible in the sunshine and in the open air is self-evident.

To avoid deformities, it is well to keep the patient perfectly quiet, especially to allow no attempts at walking; splints may be used as supports if for some reason absolute rest seems not necessary; if the splints are extended beyond the feet, they render walking impossible.

Therapeutics.—CALCAREA CARBONICA, CALCAREA PHOSPHORICA, PHOSPHORUS and SILICA are sufficient for the cure of the great majority of cases.

PHOSPHORUS holds a close relation to the osseous tissue, and in its action upon the healthy causes symptoms which bear a striking similarity to rickets; it is therefore not surprising that its exhibition, even empirically, yields very satisfactory results. The dominant school prescribe it in doses of $\frac{1}{150}$ to $\frac{1}{150}$ of a grain, dissolved in olive oil, three times daily. Even better effects are obtained from still smaller doses thoroughly subdivided.—CALCAREA CARBONICA acts upon the bony structure, has slowness of growth, tardiness of teething, late closing of the fontanelles; it also has copious sweating about the head, cold feet, great weakness, indigestion, diarrhœa, sometimes constipation. Remarkable distension of the abdomen (“pot-belly”) is one of its best and most reliable characteristics.—CALCAREA PHOSPHOR. is the favorite preparation of many physicians, possessing, it is claimed, the curative powers of the lime and phosphorus combined. The diarrhœa here is rather more aggressive and the symptoms of indigestion more marked. Vomiting is very persistent; there is more flatulence, and the abdomen, though large and full, is more lax and flabby than under CALC. CARBON. The sensitiveness to dampness which is peculiar to CALCAREA is here strongly marked, and aggravations from exposure to it occur constantly. Iodide of lime is used less often, but has done excellent work.—SILICA closely resembles CALCAREA, but the is pronounced dryness of the body with copious and *sour* sweating about the head; the abdomen is large, but sunken-in rather than distended; there is much emaciation of the body, but it is not soft and flabby; the child appears “scrawny;” tendency to indurations.

This small list embodies the very best of the therapeutics of rickets. It is only exceptionally that other remedies will be required by special and, usually, transient symptoms. Thus, KALI PHOSPHOR. (atrophy of the bones, with putrid smelling discharges from the bowels.—Bericke & Dewey), NATRUM MURIATICUM (thighs very much emaciated; slight pliability of the bones.—Gilchrist), or KALI HYDRIODICUM (enlarged glands, swelling of bones, hard lumps on cranium, decaying teeth, jerking or contracting tendons, great emaciation and tenderness of the entire body, extremely irritable and fretful.—E. C. Franklin), may be called for.—PULSATILLA, CHAMOMILLA, CHINA, PHOSPHORIC ACID, MERCURY and others, may meet gastrointestinal symptoms which demand attention.—FLUORIC ACID, when there is suspicion of syphilitic taint.—BARYTA CARBONICA when there are indurations of the glands of the neck and throat, especially of the tonsils; voracious appetite, yet emaciation; the child appears dwarfed mentally.—ARSENICUM, with its characteristic debility and restlessness, its scorbutic tendency and important gastro-intestinal symptoms, is occasionally demanded.

Cod-liver oil has been urged as an excellent food and remedy. H. H. Purdy, of New York, in a series of about eighty cases obtained under its use better results than he had from PHOSPHORUS alone.

Complications are treated as they arise.

SCURVY.

Scurvy (scorbutus) is a constitutional disease characterized by great debility, spongy condition of the gums, and hæmorrhagic diathesis with effusion of blood chiefly into the skin, but often into the muscles, joints, and mucous membranes.

Ætiology.—At one time scurvy was one of the commonest diseases with a large mortality record, appearing constantly in armies, among the inhabitants of invested cities, and among the crews of ships on long voyages; modern investigation, by determining the conditions under which it appears, has rendered the affection comparatively rare. It still occurs, either in

isolated cases or endemically in prisons, almshouses, etc., nearly always from mismanagement and criminal neglect of duty on part of the officials.

It is conceded that the cause of scurvy lies in improper dietetic conditions, namely: a lack of variety and probably want of fresh vegetables. All attempts, so far, to fix the responsibility upon the absence from the food of some one particular element, as the potassium salts, have been unsuccessful. Experience has demonstrated that the free use of the juice of the lime or lemon and of vegetables is an almost positive means of preventing scurvy; few ships, therefore, now start on a long voyage without being amply provisioned with these articles, an act of caution which in America, at least, has been made obligatory.

Physical and moral influences of a depressing character are factors of some importance. Poverty, living in damp, unhealthy quarters, exposure to great cold or heat, undue fatigue, and the use of bad food are to be mentioned in this connection; also, imprisonment, homesickness, and other depressing influences. Age and sex seem to have no bearing. Very young children and old people may have scurvy. Leduc, for instance, records the case of a man who had always lived well, becoming a scorbutic at the age of seventy-two years.

Symptoms.—The premonitory symptoms, which may continue for several days or a week, are languor, debility, pallor, palpitation of the heart, and an aching, dragging pain in the loins and legs; the patient takes to his bed, appears indifferent to his surroundings, and is very sensitive to cold. The characteristic symptoms then appear: the scorbutic condition of the gums and the hæmorrhages, occurring simultaneously or one preceding the other. The gums assume a bluish color, swell, become spongy, and bleed easily. This condition is most marked between the teeth; where teeth are absent, as in the very young or very aged, the gums are affected slightly, if at all. The teeth become loose and fall out. Superficial necrosis is not uncommon and may involve the deeper tissues, giving rise to dirty-looking, foul ulceration; this process may extend and cause a diffuse ulcerative stomatitis. The breath then becomes exceedingly foul. The tongue may be swollen, red, only slightly furred, with, in some cases, swelling of the salivary

glands; sore throat may be present in the early history of the case.

The hæmorrhagic diathesis shows itself chiefly in hæmorrhagic effusions of the skin, first, of the legs, then arms, then trunk. Large dark-red spots appear, differing in size, assuming a bluish color, shading into green or yellow at the periphery, much like the "black-and-blue" spots which result from a bump or fall. These ecchymoses do not often occur on the face or scalp. Sloughing of the skin and deep ulceration is seen in serious cases, and constitutes a grave complication. The deeper tissues may be involved, as the subcutaneous connective tissue, muscles or periosteum. In aggravated cases effusion may take place between the periosteum and bone, giving rise to the formation of nodules which may break down and form sores; the parts thus involved are usually painful and tender to the touch.

Epistaxis is a common symptom, but there are rarely hæmorrhages from the mucous surfaces except from the gums, stomach or internal organs; in severe cases there may be bleeding from the stomach, intestines, bronchi, kidneys, and effusion into the serous membranes.

With these symptoms there is rapidly increasing debility, pallor and dryness of the skin, and emaciation. The temperature is normal, sometimes below normal, save as it is raised by some existing complication. The heart beat is irregular, feeble, and compressible. The appetite is poor, and attempts to eat are rendered painful by the soreness of the gums and mouth. The bowels usually are constipated, sometimes loose. The urine is dark, of high specific gravity, often contains albumin, and sometimes an increase of phosphates. Enlargement of the spleen is comparatively frequent. There is mental depression and headache, with, in exceptional cases, such severe symptoms as delirium, convulsions, hemiplegia, apoplexy. Osler mentions the occasional occurrence of night-blindness and day-blindness.

Severe cases may be complicated by bronchitis, lobular and lobar pneumonia, or involvement of the articulations; there may be hæmorrhagic or serous effusions; endocarditis is rare.

The blood is dark fluid and shows no specific changes under the microscope. After death the spleen has been found enlarged and soft, with changes also in the parenchyma of the liver, heart and kidneys.

A special form of scurvy in young rickety children is recognized ("acute rickets"), of which sometimes hæmaturia is the only symptom. This condition closely resembles rickets; a differentiation between the two is important in order to determine the proper treatment. Barlow points out the following features as characteristic of the scurvy of infants: "(1) Predominance of lower limb affection: (a) immobility, going on to pseudo-paralysis; (b) excessive tenderness; (c) general swelling of lower limbs; (d) skin shiny and tense, but seldom pitting, and not characterized by undue local heat; (e) on subsidence, revealing a deep thickening of the shaft; (f) liability to fracture near the epiphyses.

"(2) Swelling of the gums, varying from definite sponginess down to a vanishing point of minute transient ecchymoses. These constitute the chief diagnostic differentia between infantile scurvy and rickets, properly so-called. But to them must be added as the most important diagnostic of all, (3) definite and rapid amelioration by antiscorbutic regimen."

As indicated by Barlow, infants suffering from this affection show remarkable improvement under appropriate diet; they are very fond of the juice of oranges, and eagerly suck them when offered.

Diagnosis.—The diagnosis can be difficult only when one of the two important clinical symptoms—the scorbutic condition of the gums or the hæmorrhagic tendency—is imperfectly developed; such instances are exceptional. The rapid improvement of scurvy under antiscorbutic regimen is to be remembered. Incipient or imperfectly developed cases often occur in the army; these may lack the important diagnostic signs and go unrecognized, but they recover rapidly from rest and temporary change of surroundings and diet. When scurvy occurs as an epidemic, or among an aggregation of persons, a mistake in diagnosis will scarcely be made.

Treatment.—The patient must at once be placed under the most favorable hygienic surroundings, with an abundance of fresh air and a suitable diet. The latter should aim not merely at a free supply of fresh vegetables, even though some of these, like the *cochlearia officinalis*, have a great reputation as antiscorbutics, but should above all aim at *variety*. This point cannot be too strongly emphasized. Experience has amply

demonstrated the great usefulness of the juice of lime and lemon, hence the patient should be directed, from the very beginning, to take the juice of two or three lemons daily. When there is much weakness and the stomach is irritable, scraped meat may be added to the dietary. This treatment alone is quite sufficient for the average case.

In severe cases the same general rules are to be followed and the indicated remedy faithfully administered.

Special symptoms may demand particular attention. Thus, if the gums and mouth are in bad shape, they should be cleansed often, thoroughly, and with gentleness. The use of mild astringents as a wash for the mouth is indicated in such cases. Sage-tea, solution of chloride of potassium or of permanganate of potassium, diluted carbolic acid, tincture of calendula or of hydrastis in water are very useful for this purpose. The gums may be painted with the tincture of myrrh or with a fairly strong solution of nitrate of silver. If there is obstinate constipation, copious enemata may be used. Cautious massage has been recommended to hasten the absorption of ecchymotic spots.

Therapeutics.—**ARSENIC:** great debility; nervous tension, restlessness; despondency; great thirst, the patient wanting small draughts of water every few minutes; offensive diarrhœa; fetor from the mouth; violent tearing pains, worse about midnight, better from the application of warmth.—**PHOSPHORUS:** hæmorrhagic diathesis very marked; ulcerations bleed easily; hæmorrhage from internal organs; surface pale and cold; frequent fainting.—**MERCURY:** gums are spongy and bleed much, pale blue and receding from the teeth; ulcers on the legs; legs swollen; bones ache severely; tendency to the formation of unhealthy ulcers on the skin.—**KREOSOTUM:** odor from the mouth is cadaverous; stools cadaverous; hæmorrhage dark, the blood coagulating easily; patient exceedingly weary and bruised all over; disposition sad and irritable; putrid, acrid leucorrhœa.—**MURIATIC ACID:** persistent epistaxis; sensitive ulcerations on the legs, with burning pain about their circumference.—**CARBO VEGETABILIS:** excessively low state, with marked tendency to bleed from the mucous surfaces (hæmaturia, menorrhagia, hæmoptysis) and to ulcerations. Flatulency; pallor; coldness of breath.—**AGAVE AMERICANA** is recommended by Deschere in

infantile scurvy with "pale, dejected countenance, gums swollen and bleeding; legs covered with dark, purple blotches; legs swollen, painful, and of stony hardness; appetite poor; bowels constipated; pulse small, feeble."

Consult also: *NATRUM MURIATICUM* (exceedingly despondent, but does not like to have consolation offered him); *LACHESIS*, *KALI MURIATICUM*, *KALI PHOSPHORICUM* (sepsis, discharges exceedingly foul); *SULPHURIC ACID* (aphthous condition of gums and mouth; debilitating diarrhœa; dark hæmorrhage from all the outlets of the body); *AMMONIUM CARBONICUM* (intestinal hæmorrhage); *SECALE CORNUTUM* (intestinal hæmorrhage; coldness of the body, but will not keep covered up); *SULPHUR*, *CHINA*.

PURPURA.

Under this general heading are grouped a variety of morbid conditions characterized by the spontaneous effusion of blood into the skin, mucous membranes or internal organs, and accompanied by local and constitutional disturbances which vary with the character and extent of the hæmorrhage.

Hæmorrhagic effusions into the skin are most frequent. These may be minute, resembling the bite of a flea, but lacking the central point of the puncture, and are then called petechiæ, or they may attain considerable size, when they are called ecchymoses; occasionally they are seen in streaks, when the term "vibices" is applied to them. Exceptionally the hæmorrhagic effusion finds its way into the sweat glands, giving to the perspiration a hæmorrhagic tinge, a condition described as hæmatidrosis.

In appearance the petechial and ecchymotic spots are of a bright-red color, growing livid blue, then brownish. They do not disappear under pressure.

The cause of purpura is not known. Its occurrence under a great variety of conditions—as scurvy, rheumatic affections, erythema exudativum, infectious diseases (measles, small-pox, etc.), from poisoning, or as an expression of a profound cachexia—adds greatly to the difficulty of determining a com-

mon specific cause. The close relationship to scurvy, endocarditis and probably acute rheumatism suggests the possibility of an infection. In some cases the essential feature appears to be a weakness of the coats of the blood vessels; in others, alterations of the blood seem to be the responsible cause; again, powerful nervous influences have undoubtedly been at work, and in some, auto-intoxication may be demonstrated.

Clinical experience sanctions the recognition of at least three forms of purpura, i. e., purpura simplex, purpura rheumatica, and purpura hæmorrhagica (morbus maculosus Werlhofii). To these Osler adds "symptomatic purpura," under which he groups purpura accompanying certain infections (pyæmia, septicæmia, endocarditis, typhus, measles, scarlet fever, small-pox), those of toxic origin (snake-bites, jaundice, drug-eruptions, as from ergot, belladonna, quinine, mercury, iodides), those of cachexia (scurvy, Bright's disease, Hodgkin's disease, debility of old age), those of neurotic origin (as the stigmata or "bleeding points" of hysteria and the hæmorrhagic effusions seen in certain cases of acute or transverse myelitis, in severe neuralgia, or in some cases of locomotor ataxia), and those of mechanical origin (as in epilepsy and whooping cough).

Purpura simplex is the mildest form, most frequently met among children. The hæmorrhagic effusions are most conspicuous on the legs, but ecchymotic spots also appear on the trunk and arms. The hæmorrhage is purely cutaneous, and, save occasional tendency to loss of appetite and slight diarrhœa, no constitutional disturbances are noted. Recovery takes place within a week or a fortnight. The so-called *purpura urticans* is a subdivision of this form, characterized by elevations in the skin, resembling wheals, into which hæmorrhagic effusion has taken place.

Purpura rheumatica (peliosis rheumatica, Schoenlein's disease) is characterized by the occurrence of multiple arthritis, accompanied with dragging pains in connection with the hæmorrhage. *Purpura urticans* is very common in connection with this form; sometimes the eruption is pemphigoid. The purpuric spots are most abundant on the legs and about the affected joints, and œdema is usually present. It is often seen in men of from twenty to thirty years of age. Constitutional disturbances are: sore throat, moderate fever, with a

temperature ranging as high as 103° , pain in the joints which is most pronounced as the rash appears, scanty and albuminous urine. Relapses are not uncommon, often occurring for a number of years at the same time. The prognosis is good, but sloughing of the uvula may take place.

In some cases, especially among children, there is a tendency to the development of pronounced gastro-intestinal and renal symptoms. Attacks of distressing colic, with vomiting and diarrhœa, set in, usually at night, and sometimes recur with striking regularity. In such cases there may be hæmorrhage from the bowels. The urine becomes albuminous, contains tube casts, and there may be hæmaturia. The course of these cases often is very tedious, and the termination fatal from severe gastro-intestinal disturbances or from nephritis.

Purpura hæmorrhagica has not only extensive ecchymoses, but also hæmorrhages from the mucous surfaces into the internal organs and the serous membranes. It occurs most often in delicate young persons, especially girls, but is also seen in children and in adults of full habit. There usually is a prodromal stage, consisting of weakness and prostration, lasting several days, followed by the appearance of purpuric spots on the skin, rapidly growing worse, with bleeding from the mucous surfaces (epistaxis, hæmoptysis, hæmatemesis, hæmaturia). Sometimes there is an elevation of the temperature up to 101° or 103° ; there may be no fever. Arthritic symptoms are usually present, and complications may occur, as hæmorrhagic nephritis or endocarditis. Here, also, especially in children, gastro-intestinal disturbances may be seen.

Favorable cases terminate within a fortnight. Some cases, especially in children, with severe cutaneous hæmorrhages, rapidly drift into a hopeless condition, and death has been known to occur within twenty-four hours even without previous bleeding from mucous membranes (*purpura fulminans*).

Treatment.—In symptomatic purpura the treatment must be directed to the primary cause. The simple form requires little, if any, treatment. In the severe forms every means must be employed which will support the patient, including good food, fresh air, tonics, and rest in bed. The bleeding must be promptly controlled. For the latter purpose ergot, perchloride of iron, aromatic sulphuric acid, acetate of lead, and other

astringents, may prove useful. Hot or cold water, tampons, spray of perchloride of iron, etc., or mechanical means, as pressure, but not ligation, must be employed. Hale recommends the local use of arnica and hamamelis in ten to twenty per cent. solution, especially when the bleeding is "oozing;" he also suggests hydrastis. Our chief reliance, however, lies in the application of the indicated remedy.

Therapeutics.—**LACHESIS:** Great mental and physical exhaustion, with flickering before the eyes, fainting, and almost pulselessness. The feet are icy cold. Ecchymoses all over the body, large blotches, with red and black streaks running into the surrounding tissues; hæmorrhage from the nose and bowels; jaundice.—**CROTALUS:** Tremulous weakness; weakness at the heart with faintness; thready pulse; coldness and insensibility of the skin; oozing of dark fluid blood; blood stringy or loosely clotted.—**ARSENIC:** Symptomatic purpura (sepsis, etc.). Great burning heat within, with external coldness. Dyspnœa; restlessness; thirst; anguish; fear of death; thready pulse. Purpuric spots on neck, chest, abdomen. Hæmorrhage from stomach and bowels, dark and offensive. External dry warmth feels grateful. Worse at night.—**PHOSPHORUS:** Stubborn, persistent, dangerous bleeding from small wounds or vessels, with fainting and great thirst; water is rejected from the stomach about as soon as swallowed. Hæmorrhage from internal organs (hæmoptysis). In fevers. Weakness of the heart. Albuminuria.—**SECALE:** Hæmorrhage dark, foul; symptomatic form (small-pox). Profound prostration, with great faintness and external coldness, but unwillingness to keep covered up, and aggravations from external warmth.—**SULPHURIC ACID:** Dark hæmorrhage from the outlets of the body, vomiting of dark blood; bleeding from the oral mucous membrane. Purpuric spots on forearm and legs. Exhaustion. Tremor. Said to be particularly useful in old persons.—**FERRUM:** The constitutional symptoms are comparatively light, and the danger lies chiefly in the predisposition to passive, long-continued bleeding. Moderate bleeding from nose and lungs. The skin is delicate and flushes easily. The blood is dark, and there is much debility.—**CHINA:** Great exhaustion, with profuse cold sweating. Soreness all over. Both sweating and purpura worse on the side on which he has lain. Periodicity of the symptoms. Jaun-

dice. An excellent remedy to overcome the weakness and other ill effects of the bleeding after recovery from the disease.—*BEL-LADONNA*: Hæmorrhage active, copious, from the vagina and rectum, bright red, and feeling hot to the parts over which it passes. In gushes.—*IPECACUANHA*: Hæmorrhage copious and bright-red. Continued nausea.—*ARNICA*: Copious red "oozing" from the capillaries.—*CARBO VEGETABILIS*: Copious, dark hæmorrhage in small stream or steady dropping. Epistaxis. Feels faint, wants to be fanned.—*TEREBINTHINA*: Renal complications; hæmaturia.—*MILLEFOLIUM*: Active, alarming epistaxis. *Purpura fulminans* (?).—*RHUS VENENATA*: Small, painful ecchymoses; bleeding gums; hæmaturia; paralytic weakness and soreness of the legs, better from moving them; restlessness, sleeplessness.

Consult also for symptomatic purpura: *BAPTISIA*, *AILANTHUS*, *RHUS TOXICODENDRON*; for neurotic purpura: *STRYCHNIA*, *CICUTA*, *HYOSCYAMUS*, *CHLORAL*; for arthritic purpura: *LEDUM*.

HÆMOPHILIA.

This term is used to express a peculiar tendency to hæmorrhage, possibly spontaneous, but probably always traumatic. It is congenital and hereditary, passing through many successive generations. It shows a decided preference for males, these inheriting it through the mother. A man, being one of a family of "bleeders," who has married a woman wholly free from this predisposition, will not transmit the predisposition to hæmophilia to their children; if a man, wholly free from this predisposition, marries a woman who belongs to a family of "bleeders," some of their children, at least, will exhibit this tendency to bleeding, even though the mother herself may be perfectly free from it. "The inheritance of hæmophilia is often from the father, through the daughter, to the grandson; also from the mother, through the daughter, to the grandson; and most rarely directly from the father to the son" (Hoessli). There is nothing in the appearance of the subject to indicate the existence of this anomalous condition. It is stated that

large men of fair complexion, delicate skin and full, distended cutaneous veins are more frequently the victims.

It is presumed the cause of hæmophilia lies in an abnormal delicacy of the walls of the blood vessels, easily leading to a rupture, or in deficient coagulability of the blood.

The *clinical history* may be summed up in the tendency to persistent and usually alarming hæmorrhage without adequate cause. The slightest injury, as the prick of a pin, or a trifling operation, as vaccination or the extraction of a tooth, will cause bleeding which by its persistency may defy all the commonly effective means of arresting hæmorrhage. It is probable that many fatal cases of umbilical hæmorrhage in the newborn, or of uncontrollable epistaxis from such slight causes as blowing the nose, or of dangerous bleeding of the gums from the use of the tooth-brush, are manifestations of this strange condition. Undoubtedly, fatal hæmorrhage of women after childbirth frequently arises from this cause. The rarity of hæmorrhage into the substance of the viscera without previous traumatism constitutes an important part of the differentiation between hæmophilia and the acquired hæmorrhagic diathesis.

The prognosis depends upon the degree of difficulty of controlling the hæmorrhage. While "bleeders" recover with surprising readiness from the loss of large amounts of blood, it is evident that eventually profound anæmia must result and shorten life. If childhood has been safely passed, each additional year of life lessens the danger of violent attacks, and old age in some cases is safely reached. At any time, however, a trifling injury may prove serious, either because of inability to control the bleeding or on account of resulting anæmia.

The treatment is largely prophylactic. The danger of marriage to a woman with a suspicious history, as to hæmophilia, is evident. Children who may be suspected of possessing this predisposition should be made the subjects of every possible care, both as to hygiene and medication, to improve their general condition, and should be religiously guarded against even trifling injuries which otherwise would receive no attention. In case of bleeding, recourse must be had to surgical methods.

PART III.

DISEASES OF THE NERVOUS
SYSTEM.

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Diseases of the Nervous System.

MENTAL DISEASES.

It may be said that a man is sane when his intellectual faculties and emotions are properly developed and act harmoniously, when his will-force is normal, and when he possesses the power to receive, weigh, and accurately register impressions and evidence. Whenever the emotions are unduly stimulated or depressed or the intellectual faculties are perverted, thus giving to some emotion or faculty, or to some group of them, undue prominence at the expense of others equally necessary to a proper way of living, mental health is impaired to that extent. Such impairments are common and may be harmless. The eccentricities noted in our neighbors, and by them in ourselves; the offensive or, often, harmless activity of a "crank;" the self-asserting zeal of the religious fanatic who neglects the most pressing duties of home life for the sake of obeying a fancied divine call to preach on the public streets, are the beginning of a borderland which extends well towards the doors of the Insane Asylum. The population of this borderland is the most varied of any upon earth and embraces many whom the world has cause to honor and bless. It is graded from the harmless enthusiast to the inspired prophet and leader, or from the petty thief to the homicide.

An exact dividing line between sanity and insanity cannot be established. One state glides into the other so imperceptibly that the attention of friends and of the public is not drawn to the subject until he has unexpectedly given evidence of having become a source of danger to himself and others or stands accused of some crime. He cannot be considered insane unless it

is proved that he has no longer the power to receive, weigh and register adequate evidence; the loss of this power constitutes insanity.

Insanity is not a clear-cut disease, characterized by certain anatomical changes, but a symptomatic condition which may be associated with, and presumably results from, certain organic changes in the brain, or which may occur without the slightest evidence of cerebral lesion. The manner of its onset varies; its development may cover many years and take place so insidiously that it is impossible to fix upon the time when the first deviation from a normal state occurred; or it may come on suddenly, without warning, and with every evidence of absolute hopelessness at the very beginning. Certain abnormal conditions, however, commonly exist and indicate mental unsoundness.

Disturbances of the *emotional* life are among these, and they occasionally are pronounced and then easily recognized. Some one of the emotions, as *fear*, may overshadow and control all the others, or there may prevail a state of general emotional irritability which brings into prominence now one, then another, occasionally resulting in a picture of emotional activity which is kaleidoscopic. The former, however, is by far the more common and characteristic of the insane state. In certain affections there is a continuous lessening of emotional life, associated with failing intellectual power. In the sane subject, the emotions are under the control of the *will*, and daily observation shows the strength of this inhibitory power of the will. A person easily angered may by the habitual exercise of his will-power overcome what may justly be considered a deviation from a perfectly normal state; such will-power not being exercised, the periods of anger will occur oftener, upon constantly slighter provocation, and with more disastrous results, until it becomes difficult to determine whether we deal with a fit of ugly temper or with a condition which has in it a very important element of mental unsoundness. A clear realization of the practical value of a well-taught will-power and its salutary influence throughout life is at the basis of a good education. Children should never be allowed, under the plea of "nervousness," and similar nonsense, to give way to fits of emotional excitement upon slight provocation. This applies most em-

phatically to children of a neurotic tendency. Whatever weakens the will, also weakens the inhibitory influence provided for the control of the emotions. Certain diseases, as hysteria, are found in persons who lack in will-power. Some conditions weaken the will, and among these the most prominent are chronic alcoholism, great physical exhaustion, such as result from acute and severe illness, great deprivation or hardship (imprisonment, starvation, exposure to the elements, etc.), and the decay which accompanies old age.

The *intellectual* faculties are nearly always impaired. The first indication of failure is loss of memory, then inability to fix the attention upon one subject, followed by incoherency in action and speech. The latter may be due to cerebral hyperæmia, in which case there is increased rapidity of intellectual processes which outstrips the ability to give expression to the quickly moving thoughts. Exceptionally there is remarkable vigor of the intellectual faculties, making it possible to perform intellectual tasks of the greatest difficulty without experiencing fatigue. Such state is usually characterized by cerebral hyperæmia and insomnia, often results from mental overwork done under heavy stimulation, and may be the forerunner of acute encephalitis or parietic dementia.

More immediately connected with mental unsoundness are the phenomena described as *illusions*, *hallucinations*, and *delusions*. An *illusion* is a false or distorted sensation, clothing some external object in characters which it does not possess; a *hallucination* is the perception by any of the senses of an object which has no existence. If a person in a room to another appears in the form of a tree growing out of the ground or as an angel from heaven, arrayed in heavenly garments, the person experiencing this false impression is laboring under an illusion; the perception of some object in the room for which there is no material basis whatever, as in a room wholly bare and unoccupied, would be a hallucination. Usually one sense only is thus involved. Voices are heard, visions seen, touches felt, odors perceived and tastes experienced which do not exist save in the morbid sense organs of the subject himself; hence they are wholly subjective. If suggested by an existing external object, and perverted by the sense organs, they are objective.

Although illusions and hallucinations are common among the

insane, and do essentially belong to mental unsoundness, they do not necessarily indicate insanity. A man, able to be about his business, may hear voices about him, or the voice always of the same person, or may see human forms standing near him; these will annoy him and possibly render him apprehensive; but his reason may tell him that these voices and forms have no existence in fact, and he will go on in the pursuit of his vocation; or a friend, possibly his physician, whom he has taken into his confidence will find him a willing listener, ready to be convinced that the voices and forms are in reality hallucinations. Such a person is not insane. Insanity, however, does exist when the subject is no longer able to receive and duly consider the external evidence presented to him; when it is no longer possible to convince him of the falsity of his perception; when his reason ceases to be an active factor in forming a conclusion. The subject of the hallucination now considers it tangible, real, and *believes* in it; he labors under an *insane delusion*, and is to all intents and purposes insane.

The character of the delusion and the emotional deviations are closely related, but it is not easy to affirm which is the determining factor. A delusion of a terror-inspiring character will naturally excite emotions of terror and abject fear, just as the primarily excited emotion of terror will undoubtedly affect and probably determine the general character of the delusion which is entertained.

The forms of delusion oftenest seen are: The *expansive* form, found in the delirium of grandeur, the patient investing his personality with exalted characteristics, as exquisite beauty, gigantic strength, divine goodness or wisdom, untold wealth, etc. The *hypochondriac* form, nearly always associated with a depressed state of the emotions. One of the commonest forms is the utter despondency of sexual hypochondriacs who cling to the belief that they have utterly and forever ruined their health by sexual vice. The delusions of *persecution*, usually connected with hallucinations, particularly of hearing; they are dangerous and not infrequently result in homicide, the subject endeavoring to relieve himself of a fancied persecutor or to avenge himself for some wrong which, he thinks, has been done him.

An *imperative conception* is some false idea, some notion

which in some inexplicable way takes possession of a person and is liable to influence his actions unless overruled by his reason or will-power. This impression or notion may urge the subject to commit a certain act; the impulse itself is called a *morbid impulse*, and the act, if committed, is known as an *imperative act*. These may all be restrained by the assertion of reason, and it is not infrequent to meet in practice men or women whose lives have become a perfect purgatory as the result of some morbid impulse which haunts them at all times, whose nature they recognize, and whose power they heroically resist. The impulse itself may, or may not, be based upon a delusion.

The frequency with which these impulses occur, and their variety, have led to the coining of names which express their character; thus, *kleptomania*, the morbid impulse to steal; *pyromania*, to set fire to buildings; *arithromania*, to spend all one's time in making calculations; *nymphomania*, morbid and unappeasable desire in women for excessive sexual intercourse; *erotomania*, a sexual insanity in men, which consists wholly of a Platonic attachment, etc.

Changes in *character* are marked, and must be determined by comparing the patient with his former, better self. A rapid change from a high standard of moral living to indulgence in excesses of any kind and in riotous living; from a generous husband and father to a domestic tyrant and brute; from a thrifty, careful business man to a gambler and spendthrift; from a man of truthfulness and clean speech into a habitual liar and blackguard—all these are the outcome of an affliction which is worse than death and which may come to any.

The classification of forms of insanity is so difficult a task that as yet none has been made which is in every sense satisfactory. The following, closely adhering to that of Krafft-Ebing, is adopted by H. C. Wood. (Pepper: "American Text-Book"):

Complicating or Organic Insanities.—Here insanity results from a well-defined organic disease of the brain and is often of secondary importance clinically. In acute periencephalitis (Bell's disease; acute delirium) and in chronic periencephalitis (General Paralysis of the Insane) the mental symptoms completely overshadow the brain lesion.

Constitutional Insanities.—These are due to some constitu-

tional diathesis or disease, inherited or acquired, as gout, syphilis, epilepsy, hysteria, or to constitutional poisoning, chiefly chronic alcoholism.

Pure insanities, in which neither organic brain-lesion nor constitutional diathesis or disease, nor chronic poisoning, can be found to account for the mental disorder. These are divided into (a) *functional* insanities (melancholia, mania, confusional insanity, terminal dementia) which occur in those who seem to possess no particular tendency to mental disease, are often brought on by causes which operate for a limited time, and from which recovery is frequently had; (b) *constitutional* insanities (constitutional affective insanity, moral insanity, paranoia, periodic insanity), which depend upon a neuropathic tendency; these forms usually develop gradually and become more pronounced with increasing years; permanent recovery here is rare.

ORGANIC INSANITIES.

ACUTE PERIENCEPHALITIS.

Acute periencephalitis, acute delirium, Luther Bell's disease, phrenitis mania gravis, or typhomania, is an acute disease of the brain, involving the cerebral cortex and meninges, characterized by violent mania, fever, coma and collapse. It occurs in adult life, regardless of sex, and in persons who have endured much anxiety, often great privations, usually associated with ambitious aims never realized; in all such cases, connected with much wear and tear of the nervous system, some sudden bitter disappointment or great sorrow may constitute an immediate exciting cause. It occasionally occurs in connection with acute fevers (thermic fever) or from some injury (blow) to the head. It presents no distinctive anatomical changes. After death intense hyperæmia of the cerebral cortex and meninges is found to exist, followed by œdematous exudations with great numbers of leucocytes in the lymph sheaths and perigangliar spaces. There may also be engorgement of the bases of the lungs and, occasionally, deglutition pneumonia.

Symptoms.—The onset of the disease may be sudden or preceded by restlessness, slight delirium at night, occasionally brief attacks of unconsciousness, not unlike petit mal, especially in

the morning, and rarely an epileptiform seizure. Suddenly delirium sets in, which from the very start assumes the form of an actual frenzy. The patient yells, screams, fights, attempts to get away from his attendants, gesticulates wildly, and continues in an ecstasy of maniacal excitement which appears beyond the endurance of the strongest man. He usually has hallucinations and vaguely formed delusions about which he talks wildly and incoherently. This delirious state at first may be interrupted by brief periods of rest, but these grow shorter, and soon cease. During this time the tongue is dry, the pulse rapid, but comparatively soft and compressible. The temperature often ranges from 102° to 104° , and possibly higher. Wood states that it rises and falls many degrees many times during the twenty-four hours, and that maniacal outbursts produce an immediate rise of the temperature. Insomnia is almost absolute, and it may require heavy doses of hypnotics to give the patient any rest. Food is usually refused and administered under great difficulties. The eyes present nothing characteristic; the pupils may be contracted, dilated, or normal. The skin at first is hard and dry; later it peels off, and before the termination of the case may be ulcerated or gangrenous in spots, and covered with abrasions and wounds which the patient has inflicted upon himself. Anæsthesia is usually present. The violence of the delirium subsides in the course of hours or days, leaving the patient in a state of utter exhaustion and in a comatose condition from which at first he may be roused. The coma soon becomes profound, the temperature sinks to subnormal, the pulse grows weaker, the skin cool, and death takes place from collapse.

The diagnosis is rarely difficult.

Typhoid fever bears considerable resemblance to the late stage of acute delirium, but in typhoid fever the characteristic eruption, the splenic enlargement, and the history of the case establish the identity of the disease. *Pneumonia* may have violent delirium and is easily overlooked. But cerebral pneumonia almost always occurs in young children or in old people whose vitality has been exhausted by excesses, while acute delirium is a disease of middle life; the presence of the physical signs of pneumonia must be looked for. *Acute meningitis* has general hyperæsthesia, stiffness of the muscles of the back and

extremities, and severe headache. *Uræmic convulsions* may have violent acute mania, followed by coma; but the fever of acute delirium is absent, and examination of the urine will determine the diagnosis.

The *course* of acute periencephalitis is rapid. Severe cases usually terminate within a week; others in two or three weeks.

The prognosis is unfavorable. From sixty to seventy per cent. of all the cases die; the others rarely make a complete recovery, some mental derangement usually remaining.

Treatment.—The routine treatment consists of general and local bleeding, the efficacy of which is universally admitted, of free purging, and of the use of cold applications to the head, of the cold pack and the cold bath. Sleep must be induced by hypodermic injections of morphia or hyoscin or chloral hydrate by the mouth. Good results have of late been claimed for hypodermic injections, every eight hours, of one gramme of ergotin or of the filtered solution of the officinal extract of ergot in freshly boiled water. Cardiac and alcoholic stimulants are indicated in the late stages. Much attention should be paid to feeding the patient, particularly milk and eggs.

ACONITE, BELLADONNA, HYOSCYAMUS, STRAMONIUM and other remedies capable of controlling the existing cerebral hyperæmia and inflammation, and covering the type of delirium here found, are to be exhibited; they usually render bleeding unnecessary. Indications will be found under the general heading "Therapeutics of Insanity."

CHRONIC PERIENCEPHALITIS.

Synonyms.—Paralysis of the insane; paretic dementia; periencephalo-meningitis; general progressive paralysis; general paresis; chronic diffuse meningo-encephalitis.

General paralysis of the insane consists of a degeneration of the cerebral cortex and meninges, sometimes extending to the medulla and cord, characterized by motory derangements terminating in paralysis and psychical changes terminating in mania, delusions, and dementia.

Ætiology.—This affection occurs very much oftener in men than in women, the latter constituting about one-sixth of the entire number. It is essentially a disease of middle age, from the fortieth to the fiftieth year. It is said that the intense ap-

plication of Americans to business renders them liable to fall victims to general paralysis earlier in life than is the case in other countries. The most active predisposing factor is a well-defined neurotic tendency, intensified by habitual hard, fast living, with indulgence in all sorts of excesses, intense application to business, indulgence in alcoholic stimulants or venereal excesses, with their frequent accompaniment, syphilis. Ambitious professional men, actors, and officers in the army and navy furnish many cases. Heredity is of slight importance. Tumors of the brain, sunstroke and injuries to the head may be exciting causes.

Morbid Anatomy—The changes usually begin in the cerebral cortex and later extend to the medulla and spinal cord; sometimes these all are simultaneously involved; exceptionally the spinal cord is affected first. Upon section there is found thickening and opacity of the meninges, which often firmly adhere to the cortex; œdema of the pia mater; often internal hæmorrhagic pachymeningitis; increase of cerebro-spinal fluid; marked atrophy of the cerebral convolutions, especially of the frontal lobes. The brain-cortex is sometimes firmer, again softer, than normal, and often contains minute cysts or cavities. The white matter of the brain is firm and shows no striking changes; the gray matter is softer and obscurely outlined.

The ventricles are dilated and their lining neuroglia granular. Changes peculiar to arterio-sclerosis, with softening and hæmorrhage, occur in the blood vessels. Bevan Lewis sums up the histological changes as follows: A stage of inflammatory change in the tunica adventitia of the arteries with excessive nuclear proliferation, profound changes in the vascular channels, and trophic changes in the surrounding tissues. A stage of extraordinary development of the lymph-connective system of the brain, with a parallel degeneration and disappearance of nerve elements and the axis cylinders of which they are denuded. A stage of general fibrillation with shrinking and extreme atrophy of the part involved.

Symptoms.—What may be called the prodromal stage of the disease consists of a condition which at first closely resembles the cerebral form of neurasthenia. The patient appears somewhat unsettled, irritable and notional; he is easily excited, and finds it difficult to fix his attention upon work in hand or to do

mental labor which heretofore has been performed with ease. In the course of time members of the family and intimate associates realize that some change has come over him. Mental and physical restlessness, with insomnia, often becomes a source of annoyance. He has headache, dizziness, ringing in the ears. Krafft-Ebing points out that a characteristic feature of its stage is a growing lack of punctuality in meeting engagements and a tendency to get lost in familiar streets. The change of character and habits is progressively downward. He grows inattentive to business; often he develops a craving for alcohol, and, heretofore a man of sobriety, now tipsles constantly and possibly drinks heavily; he grows coarse, indifferent to the common courtesies of life, drifts into sexual excesses in his family or outside of it, and is liable at any time to commit flagrant offenses against the law and common decency. In many instances a boundless egotism crops out. Motor disturbances may have already existed, but now become pronounced; the speech and gait, hereafter more fully described, become characteristic; there is inequality of the pupils, often the Argyll-Robertson pupil. Physical exhaustion increases perceptibly; sometimes there is now paresis of the extremities. Epileptiform seizures are common, and mania is a prominent feature of the case. Eventually both mind and body are wholly wrecked. There is complete dementia and general paralysis, an actual living death. The end comes from exhaustion or some intercurrent affection.

It is possible to recognize distinct types. There may be simply progressive failure of the mental powers, without marked emotional disturbances, the patient drifting into a second childhood; these cases are known among the people as "softening" of the brain. Another class has the same progressive mental failure, but also *delusions of grandeur*, with outbursts of violent mania. Again, *hypochondriasis* may be the most prominent mental symptom, rendering the patient exceedingly depressed and determining the nature of the delusions under which he labors. Or, less often, periods of excitement and of depression alternate, succeeding each other rapidly, and constituting a *periodic* or *circular* insanity.

The motor defects show themselves chiefly and early in disorders of co-ordination. This is first shown in the hand, particularly in persons who write as a matter of business, in profes-

sional engravers, and in mechanics whose work is delicate and requires perfect muscular control; there is not necessarily loss of gross muscular power. *Speech* becomes disturbed on account of faulty action of the lips and tongue; it is thick, stuttering, and entire syllables may be "swallowed." The mental faculties having become involved, he thinks slowly and formulates thoughts into words slowly; hence, speech is also slow and hesitating, sometimes uttered in a "sing-song" fashion. The *gait* is uncertain, especially when he attempts to turn quickly; often it is ataxic. As the disease progresses he can scarcely go up or down stairs, walks with feet wide-spread, tumbles down easily, and in walking assumes a position of body which shows that he is constantly afraid of falling. Finally, he can no longer stand or walk, and is forced to spend the remainder of life in a recumbent position. The knee-jerk is usually exaggerated. Vesical and rectal symptoms develop as paralysis becomes profound. Epilepsy may occur very early in the course of the disease, and its full significance is then rarely appreciated. The convulsions may be general or of the Jacksonian type, with or without loss of consciousness. They are frequently preceded by a vertiginous aura. They are liable to increase in frequency as the disease progresses, and are followed by incomplete paralysis or great muscular weakness and tremors. When the seizures are general and severe, consciousness is usually lost; exceptionally they prove fatal. *Apoplectic attacks* are not so frequent. They may come on gradually and disappear in the same manner, leaving more or less motor disturbances and lack of muscular power; sometimes they are severe and cause hemiplegia; rarely they prove fatal. *Sensibility* is not greatly disturbed, though lessened in the advanced stage. The patient may have tactile sensation, and yet complete analgesia. Thus H. C. Wood relates the case of a woman who took a bath so hot that she was actually scalded to death. Violent lancinating pains cause much suffering if tabes forms a feature of the case. The *temperature* is nearly always elevated in the evening. Perhaps its most striking peculiarity is the sudden and great rise from slight causes. Epileptiform seizures are often, but not always, preceded and followed by an elevation of temperature for several hours.

The symptoms arising from disease of the spinal cord may

precede or follow the stage of mental disturbances; they follow in 30 per cent. of the cases.

Diagnosis.—The recognition of dementia paralytica in the early stage is exceedingly difficult. It depends very largely upon a careful comparison of the subject's present mental condition and conduct, in every direction, with his previous mental state and former conduct; if no explanation can be found for an existing and undesirable change of character and life, and especially if cerebral vaso-motor disturbances are apparent, the approach of parietic dementia may be suspected. This suspicion will become an almost certainty in the presence of characteristic pupillary changes and evidence of muscular incoördination.

While alcoholic insanity, acute mania, or monomania with delusions of grandeur in some respects resemble general paresis, the similarity is too superficial to create embarrassment.

Cerebral syphilis, however, presents many symptoms which suggest general paresis; but in syphilis epilepsy is much oftener local than general; symptoms of paralysis occur earlier, expansive delirium is rare, embarrassment of speech from muscular incoördination is absent, and antisyphilitic treatment usually affords relief.

Prognosis.—Recovery is so rare that hopes of it dare not be entertained. The duration of the disease is usually from three to four years, but life may be spun out for ten or even fifteen years. There are occasionally periods of remission, with remarkable improvement of the patient, which afford ground for delusive hopes of actual gain.

Treatment.—The general treatment consist of relief of sleeplessness by appropriate measures, careful nursing, perfectly quiet life, with an abundance of plain, wholesome, non-stimulating food, warm clothing, massage, bathing and carefully regulated exercise in the open air. All these can best be secured in an asylum. In the late stage special precautions must be taken to enforce perfect cleanliness, especially in protecting the patient against being soiled by discharges from the bladder and bowels, in order to prevent decubitus.

If syphilis is connected with the case, the iodide of potassium must be given for a long time, from ten to fifteen, or more, grains daily.

The remedies which are useful in the treatment of insanity

and of epilepsy must be consulted. BELLADONNA, AURUM, PLATINA, HYOSCYAMIN, STRAMONIUM, PICRIC ACID, SILICA, ARSENIC, NUX VOMICA, STRYCHN. ARSEN., and many others, will at various times be suggested by symptomatic indications.

CONSTITUTIONAL INSANITIES.

Of the forms of insanity which occur in connection with constitutional diseases and subacute or chronic systemic poisoning, the most important are the gouty, the epileptic, the hysterical, and the toxæmic.

Gouty Insanity.—The close relation between gout and the nervous system has long been recognized. Cullen considered gout primarily an affection of the nervous system, in view of the common occurrence of marked neurotic symptoms, ranging from violent headache, neuralgia, sciatica and paræsthesia to serious cerebral disease, particularly basilar meningitis and apoplexy. Seizures of gout are commonly associated with, and may be preceded by, great mental depression; excessive irritability, almost uncontrollable and sometimes amounting to a furious state, are common. Hallucinations, delusions and loss of mental power are known to have followed these manifestations, and Berthier, in a study of this subject, shows that dementia, melancholy with stupor, and mania have resulted from the constitutional affection. It is probable that the existence of a hereditary predisposition to insanity must be recognized in such cases.

Epileptic Insanity is characterized by violent delirium which may last only a short time, but often continues for days, with ideas of persecution, sometimes with erotomania, and incessant and boisterous talking; the hallucinations partake of the type of the emotional disturbances. A furious mania is not infrequent, with suicidal or homicidal tendency. The paroxysms may be of frequent occurrence and resemble one another. The tendency is to mental degeneration and dementia. True insanity may occur, usually melancholia, with ideas of persecution. The disposition in such cases frequently is selfish, revengeful, brutal. I had for years under my observation an epileptic boy, about eighteen years of age. His chief amusement consisted of catching animals, chiefly dogs and cats,

whom he would torture and finally kill by cutting their throat with a dull jack-knife, often himself receiving bad hurts in their desperate attempts to escape or defend themselves. He was confined after making an assault upon a younger brother, and soon died, wholly demented.

The term *Hysterical Insanity* applies to that mental irresponsibility which is the outgrowth of the reckless indulgence of "self" and of the intense emotional excitability which characterizes the hysterical state. In fact, it is an exaggeration of the mental and emotional manifestations of hysteria, possessing to the full extent its love of self, its tendency to all kinds of deception, intangible notions and delusions, perverted imagination and liability to all kinds of fictitious diseases, terminating in actual, often intense, suffering, and demanding restraint for the protection of the patient and those about her. Such cases are not infrequent and by their recurrence may result in permanent mental derangement.

The *Toxæmic Insanities* find their type in subacute and chronic poisoning with alcohol, which is considered under the heading "Alcoholism."

PURE INSANITIES.

MELANCHOLIA.

Melancholia, as it presents itself to the general practitioner, is in its milder form simply an exaggeration of those periods of mental depression which are not incompatible with health and to which all are more or less subject. Persons suffering from chronic hæmorrhoidal or abdominal disease are particularly liable to such attacks. If such periods of mental depression are very pronounced and persist for a long time, there is sleeplessness, not amounting to absolute inability to sleep, but consisting of wakeful, broken nights, frequently with anxious and distressing dreams, loss of appetite, impaired digestion, and a state of nervous instability which suggests neurasthenia. In such cases everything partakes to the patient of a sombre coloring; poverty stares him in the face; ruin of reputation is unavoidable; he feels that he is predestined to make a miserable failure of life; he has no friends, no future, no comfort of any kind. Brooding and mental isolation are natural; his atten-

tion is fixed upon himself as the most wretched of human beings, and cannot be diverted. Occasionally there may be some real disappointment, sorrow, or loss; but it is invariably true that its seriousness is tremendously exaggerated or that it is kept fresh in the mind long after it should have ceased to excite regret. The patient usually is worse in the morning; but throughout the day he is lost in apathy, sits in his chair wholly absorbed in himself and in his moody thoughts, entirely beyond interest or concern in what is going on about him. His reasoning powers at this stage are intact; if roused, he talks intelligently, but soon sinks back into the former apathy. In other cases, this same condition of complete absorption in depressing contemplations having been reached, the patient is demonstrative, talks loudly about his woes, moans and laments, wrings his hands, tears his hair, moves about rapidly and aimlessly, and is altogether unstrung. Delusions, usually unsystematized, prevail after a time; they are more frequently delusions of hearing, related to the peculiar form which his mental depression assumes, but they are invariably unpleasant and distressing; voices never carry to him glad news, but always bring words of censure or threats; the spirits that visit him never come as angels of light, but as fiends from hell; the odors he smells are never pleasing, always disgusting.

In the severer forms the general nervous systems now gives signs of suffering. Sensory disturbances are common, as irregular hyperæsthesia, anæsthesia, or paræsthesia; there is often persistent neuralgia and constant and severe headache. One of the most painful symptoms is intense præcordial anguish, a feeling of aching in the heart as though it would burst, often in paroxysms associated with great bodily restlessness, gradually rising to a condition of actual frenzy, accompanied with rapid and superficial breathing, excited action of the heart, small thready pulse, cold and pale skin. During this furious delirium (*raptus melancholicus*) the patient is entirely beyond control; he is violent in the extreme, but his destructiveness is directed towards himself. He tears his hair, destroys his clothes, mutilates himself (often genitalia), but uses no violence toward others, save as they endeavor to forcibly interfere with his actions. These paroxysms pass off in profuse sweating. Furious delirium is particularly liable to

occur in cases which have developed rapidly. General health has become lowered. Even from the first the tongue has been coated, the breath foul, and all appetite lost; now aversion to food is marked; the profound melancholic will not only refuse to take nourishment, but may desperately resist all attempts to force it upon him. Consequently the patient becomes emaciated and weak. The urine is scanty and rich in urates, phosphates and oxalates. The temperature is habitually subnormal, with harsh, clammy skin and cold legs and feet.

Even mild cases are marked by loss of sexual desire and power, which are recovered when improvement takes place; in women the approach of menstruation causes a noticeable aggravation of the mental depression, not infrequently associated with great hysterical excitement. In the late stages sexual power is lost.

The special forms usually recognized are: *Melancholy without delirium*, which by Krafft-Ebing is again subdivided into (a) melancholy without intellectual insanity, but associated with hysteria and neurasthenia; (b) melancholy with præcordial anguish; (c) melancholy with hallucinations and delusions; (d) melancholy of a religious type; (e) hypochondriac melancholy, the delusions being associated wholly with himself (thinks he is rotten throughout with syphilis) and usually tinged with notions concerning his sexual system.

Melancholia attonita, in which the patient is in a condition of stupor, leaving the impression of a demented state, save that to the closely observant the face betrays the play of emotions and the anguish produced by them. Sensory disturbances are common here; there is great depression of functions and nutrition; mild muscular contractions and muscular rigidity are common, and a cataleptic state sometimes prevails.

Melancholia agitata is characterized by fear and terror, with the violent frenzy which has been described.

The *Katatonia* of Kahlbaum has less profound melancholy; catalepsy is comparatively frequent; and there are fixed delusions of an expansive type, such as the belief that he is a great politician, actor or preacher. There is a tendency to constant repetition of words and phrases (verbigeration) when talking, and motor-tension. Alternating cycles of atony, excitement, confusion and depression. Tendency to profound mental weakness, even dementia.

Melancholia is usually associated with waning physical power, regardless of age; such a condition, however, is oftener found in the more advanced period of life than during youth. In feeble women the physical exhaustion following confinement and the drain made upon them by lactation predisposes to the affection. The *course* varies greatly; many mild cases recover without any treatment, while others defy the most intelligent measures taken.

The prognosis is nevertheless good, for about 60 per cent. of all cases terminate favorably. It is, however, notable that recovery is always slow. A small per cent. of all the cases end in dementia. Death usually is due to some complication, as tuberculosis.

Treatment.—In all cases moral treatment is of supreme importance. It is practically worse than useless to argue with a confirmed melancholic; his attention must by some means be drawn from himself. To this end he should be taken from home. In view of the fact that even in the milder forms of melancholia the patient may at any time become dangerous, at least to himself, he cannot be sent from home alone, but must be in charge of a strong, intelligent and agreeable attendant, who is capable of assuming the really serious responsibility of such a case. Such an attendant is usually far more desirable than the wife, husband or child, whose presence is a constant reminder of conditions and associations which it is desirable to have forgotten. Experience shows that the seaside usually is to be avoided. Neither is any place desirable which develops a sense of loneliness. Opportunities for diversion and amusement are absolutely indispensable. If there is a lack of means to provide for these necessities, it is best to secure admission to some asylum. Wherever the patient may be, his general health demands the best care. An abundance of physical rest is highly beneficial, and the "rest-cure" has yielded excellent results. Massage, electricity, hot baths and moderate exercise in the open air are important. The aim of providing exercise is chiefly for the purpose of occupying the patient, of giving him something to do. Exposure to the heat of the sun must be carefully avoided. The diet must be abundant; experience shows that even patients who have been considered dyspeptics, and with whose diet great pains have been taken, are fre-

quently much benefited by forcing upon them a large variety of hearty, common food, taken in generous quantities, and accompanied with a moderate allowance of wine, beer, or other stimulants. In some cases an exclusive milk-diet meets all the conditions.

Frequently a careful examination of the case reveals the existence of some constitutional or local disease, and, if so, that must receive attention. Hæmorrhoids and other rectal diseases are closely associated with melancholia, and their recognition and removal bears directly upon the cure of the mental disorder. Nervous excitement is to be subdued by proper management and by the exhibition of the symptomatic remedy. In extreme cases hyoscine (gr. $\frac{1}{120}$ to $\frac{1}{80}$) may have to be exhibited. Sleeplessness may be combated by hot baths or frequently changed hot packs; liberal allowance of hot milk or a light meal just before sleeping-time may prove very helpful. These measures should be honestly tried before resorting to a hypnotic. If they fail, chloral hydrate (grs. x to xx) are in the lighter cases and in the early part of the disease to be preferred to opium; later, opium not only yields better results in affording sleep, but often has a desirable constitutional effect.

At no time must the patient be left alone in the room, even though only for a few minutes; a seemingly harmless subject may take advantage of the situation and inflict upon himself irreparable injury. In the severe forms of the affection constant watchfulness must be exercised for symptoms indicating the approach of a maniacal outburst.

In the early stage the Succus Passiflora, the expressed fresh juice of *Passiflora incarnata*, given in half-teaspoonful doses at short intervals, may quiet the patient and give him sleep.

MANIA.

Mania, according to Spitzka, is a form of insanity characterized by an exalted emotional state which is associated with a corresponding exaltation of the other mental and nervous functions; the typical condition of the maniac, according to the same author, is a loosening of the inhibitions, or checks, both those of organic and of mental life.

The onset of mania, with rare exceptions, is not sudden.

There is, for a period of about three months, a general indisposition, with loss of appetite, foul taste in the mouth, furred tongue, indigestion and constipation. The head feels full and tense, especially over the eyes and in the occiput; there is aversion to exertion, inability to concentrate his thoughts upon anything, he does not sleep well, and attends to his daily duties only by dint of special exertion. After a time he appears to improve greatly. He eats well, sleeps well, works well, and thoroughly enjoys himself. Soon it is noticed that he is rather emotional and in many respects seems unlike his former self. He appears a part of the time as though slightly intoxicated. His fancy is stimulated; his speech rapid, later confused. This confusion arises from the impossibility of transmitting the conception over the speech tracts fast enough to have them expressed in words. He now easily glides into a declamatory style of speech, accompanied with impressive gesticulations and restless moving about; he cannot remain quiet. His moods change rapidly; he laughs easily one moment and is ready to take offense at the most trivial occurrence in almost the same breath; contradiction is unbearable to him. He is conscious of a feeling of exalted well-being and indulges himself readily in the gratification of every desire, often exercising a lavish hospitality and giving himself up to fast and riotous living. His moral perceptions are both blunted and overcome by a feeling of superiority which places him above the common restrictions of civilized society. He becomes openly unchaste; his gestures and actions are frequently those of a black-guard, and throughout there is a tendency to angry excitement. Illusions and hallucinations now occur; they also are usually of a gay, expansive character, and more frequently hallucinations of hearing; but all the senses may be involved. It is to be emphasized that no depressing, but always expansive, delusions are here built up, even upon disagreeable hallucinations. Any severe emotional excitement of a disturbing angry character may now bring on violent motor delirium. The patient raves, yells and screams; rushes wildly about the room, smashing furniture, throwing chairs and dishes through the windows into the street, tearing off his clothing, sometimes, but rarely, attacking his attendants. Frequently there is much sexual excitement, i. e., satyriasis and nymphomania, and both men and

women will endeavor to expose themselves nude in some public place, as an open window. Often the hallucinations appear to change constantly and in rapid succession. The sensations are blunted, so he is insensible to a common injury. His strength and physical endurance are wonderful; for day and night, with scarcely a moment's rest or sleep, he dashes about, raves, curses, swears, blasphemes, without an indication of weariness.

A disgusting filthiness is peculiar to this condition, the patient urinating and defecating anywhere and without concern for the presence of others, bedaubing the walls and himself with the excrements, and sometimes even eating them.

Throughout, the appetite is usually excellent and digestion perfect, but there is constant loss of weight, undoubtedly on account of the long-sustained powerful exertion.

Often periods of furious mania alternate with periods of comparative calm.

Usually convalescence takes place slowly, the first indication of it being the occurrence of a brief period of lucidity, which is followed, possibly within a short time, by a recurrence of maniacal excitement or by a reactionary depression, but these periods of lucidity become more frequent, last longer, and finally merge into each other.

Recovery may take place in a few days or not for a year; commonly the duration of the disease is from three to six months. The prognosis is favorable; from 60 to 80 per cent. of all the cases get well. Usually, a patient who has perfectly recovered from one attack of mania is not liable to have a recurrence of the disease. Acute mania may become chronic or a state of partial dementia may develop; death occurs from exhaustion.

Mild cases present to a varying degree the emotional and mental conditions described, with insomnia, hallucinations and immodesty, but escape the furious delirium.

Chronic mania is the outgrowth of acute mania or of a slowly developing mania which lacks the violence characteristic of the acute form. There is exalted emotional excitement, at times sufficient to suggest acute mania and possessing the same peculiarities, the difference being in the severity of the symptoms, not in kind. The hallucinations are changing and

unsystematized; the moral sense is perverted or abolished; unhinging in the sexual sphere is common. Recovery may take place, but the rule is termination in dementia within two or five years.

CONFUSIONAL INSANITY.

A rare form of insanity characterized by incoherence and confusion of ideas, without essential emotional disturbance or true dementia. It usually results from emotional shock, cerebral exhaustion or excesses, and may follow severe acute diseases (as rheumatism, typhoid fever, diphtheria) or surgical operations.

The patient experiences hallucinations and delusions which resemble those of acute mania or, oftener, of melancholia, but they do not affect the emotional life. Delusions of identity are common; for instance, a perfect stranger may be taken for an intimate friend whom he does not resemble at all; or he fails to recognize a street on which he has lived for years. The speech is characteristic. It is incoherent, hesitating, broken, confused. The words are enunciated with clearness, but there is startling irrelevancy, a complete absence of sense. This is undoubtedly the result of a true incoherence in ideation.

The essence of the psychical state is "confusion;" the patient himself is vaguely conscious of this fact, speaks of it often, and enlarges upon the change which has taken place in him; later he no longer clearly recognizes his present condition.

The general health in well-marked cases suffers, marked physical exhaustion being particularly conspicuous. The pulse is rapid and feeble; œdema arises from great vaso-motor weakness; the cutaneous reflexes and sensibilities are lessened; the bodily temperature is subnormal; the urine is excessively rich in phosphates, and there is progressive loss of weight. In some cases there is mild delirium, with the possibility of outbreaks of paroxysms of fury, not unlike those of acute mania. Sometimes the delirium resembles that of subacute alcoholism, fear and tremulousness being pronounced.

The prognosis is favorable. By far the greater number of cases—from 60 to 80 per cent.—recover, unless a serious organic disease prevents; recovery, however, is liable to be very slow.

In a small proportion of the cases the mental disorder assumes a chronic form; in others death results from complications.

Treatment—Here, as in all mental disorders, the patient should be sent to an asylum unless possessed of sufficient means to receive in his own home all necessary skilled attention. Absolute rest must be enforced, at least until the physical exhaustion has been largely corrected. Frequent and generous feeding is of the greatest importance; patients will readily digest a large amount of food; should resistance to feeding be offered, force is to be employed. A low bodily temperature being conspicuous, the necessity of keeping the room very warm, of providing thick and warm clothing, and of using all forms of external heat (hot-water bed; hot packs) readily suggests itself.

Aside from drugs which may be needed to insure sleep at night and to relieve delirious excitement, the treatment is symptomatic, with particular reference to the cause of the mental disturbance. The use of large doses of bromides is especially objectionable here because of the existing depression in the nutritive as well as in the functional activity of the nerve cells.

TERMINAL DEMENTIA.

This term is used to describe that permanent enfeeblement of the entire mental sphere which constitutes the conclusion of uncured acute insanity. In some cases the primary disease passes directly into the dementia; in others through an intermediate stage of chronic secondary mania which is marked by confusion of ideas and mental decay; in the latter case the dementia is "tertiary."

The terminal insanity of some forms of melancholia or that following violent outbreaks of maniacal furor is characterized by a perfect blotting out of mental life. The walk is shambling and cowering; the face wholly void of expression; speech consists of a few indistinctly spoken words; the habits are filthy; the patients are as helpless as little children, unable to attend to the commonest demands of nature. Death comes to their relief in a few years. Others are capable of discharging some of the simpler duties of life and may be utilized in the care of the farm and house, or even of the sick. Still others preserve some of the peculiarities of the primary disease, which may easily be

recognized. Thus, some are able to be about and feed themselves, but are viciously dirty and become objects of disgust; others are quiet, passing the entire day without speaking a word or giving any evidence of the power of observation or thinking; still others are restless, noisy, talkative, destructive, all without purpose (*active or agitated dementia*, a sequel of mania and agitated melancholy). As Spitzka expresses it, "the fundamental feature of terminal mania is an *acquired mental defect*, and this may vary from a mere loss of memory, usually of recent events, or of the reasoning power, to the nearly complete extinction of mind."

General nutrition in all these cases is good; the patients eat well, sleep well, and gain in weight. On the other hand, cutaneous eruptions, hæmatoma auris, premature grayness, and fatty and fibrous disease of the blood vessels are common.

NEUROPATHIC INSANITY.

This term is used to cover such forms of insanity as depend upon, or are closely connected with, failure of development or faulty development of the nerve centres, inherited or acquired. If inherited, they are nearly always the result of a neurosis which started generations back, or of insanity or disease of the nervous system, drunkenness, syphilis, or extreme exhaustion of the vital powers of the parents by great poverty, privation or long-continued severe illness. It can not always be positively ascertained where lies the beginning of this fateful inheritance, for, thanks to the compensatory efforts of nature by the introduction of new blood and the influence of new factors, each generation undergoes modifications and changes which tend to weaken and finally overcome these inherited vices of constitution.

Not-inherited ætiological factors are: severe, exhausting illness during childhood and youth, breaking down the nervous system; exceptionally bad sanitary, hygienic and moral surroundings; injuries; sexual vices, acquired in childhood or during the period of pubescence; the varied influences which in the young develop faulty habits of mind and body; epilepsy and similar functional diseases of the nervous system; alcoholism; syphilis.

Generally speaking, the pure insanities which result from an inherited neurotic taint or tendency are characterized by general and gross defect in brain development (as in idiocy); or they show anomalies in the shape of the cranium, its peripheral growth and innervation (as in cretinism, imbecility, original monomania); or in convulsions during childhood; or in a generally neurotic constitution and mentally abnormal character. The mental disorders may date from birth, or puberty, or second climacteric, or may be developed at any time of life by exciting causes. The "neurotic vice" may be acquired through traumatism, poisoning (alcohol), or on the basis of such constitutional neuroses as epilepsy and hysteria. The pure insanities which are the expression of a continuous neurotic vice, but not dependent on the great neuroses, comprise idiocy, imbecility, cretinic insanity, monomania, and periodical insanity. Those which are dependent on the great neuroses comprise epileptic, hysterical and alcoholic insanity. (Spitzka.) It is readily seen that an infinite variety of affections of the nerve centers and brain must be caused by this neurotic taint; these range from eccentricities of character to the most pronounced phase of mental aberration, the extent of the mischief done depending upon the extent to which the nervous system and the brain are affected. Further, if the harm done affects chiefly or entirely the intellectual sphere, the disorders arising belong to the disorders of the intellect; if the moral sphere, the result is a moral disorder and perversion, i. e., criminal tendency.

This subject is both fascinating and almost inexhaustible.

It deals largely with the "borderland" between sanity and insanity to which reference has already been made, and shows the gradual, scarcely perceptible shading from the merely eccentric mind to the genius whose work endures for all time, from the harmless crank to the monster whose crime fills the world with horror. That the possible and frequent association of genius with insanity is based upon facts appears from even a superficial study of the life-history of many brilliant men and women and of their antecedents, as to inherited neurotic tendencies. On the one hand such an examination clearly demonstrates the close relation between poetic ecstasy and a morbid imagination, between the heavenly vision and an insane delusion,

between martyrdom and the exaltation born of mental disease. On the other hand it enables us to find in the parents or grandparents the first cause of the neurotic tendency which has given to one descendant abnormal greatness, while to another it has bequeathed mediocrity, imbecility, or a heritage of woe and shame.

The inherited tendency to the commission of crime is in itself of sufficient importance to merit the particular attention of not only alienists, but of all intelligent citizens. A thorough study of the question, which must here be ignored, leads to the conviction that our present civilization has not yet grasped the real value of educational measures in dealing with crime itself, nor the relation of sanitary reforms and of careful observance of physiological laws to the existence and growth of the criminal classes.

The most striking characteristics of moral insanity are the utter lack of perception as to right and wrong and the frequency with which sexual perversions are observed among this class. I happen to be familiar with the history of a peasant family (Marsch) living in the central part of Prussia about 1856 to '60, which illustrates the extent of the horrible possibilities of such a dreadful inheritance. The father died in middle age, without proof of any particular crime resting upon him; the mother, a confirmed thief, was sentenced to State prison for a term of years, when more than eighty years old, for having harbored murderers and thieves and for having received stolen property. One of the sons was sentenced to imprisonment for life for having murderously assaulted a comrade in the army; one sister killed herself in prison while undergoing trial for murder; another sister was beheaded, after having been found guilty of complicity in several murders, among them the murder of her husband by one of her brothers; another brother, physically, a perfectly formed specimen of a man, lived a life of unbridled crime, with every evidence throughout his career of remarkable presence of mind, executive ability and ingeniousness. As a child he spent all his time catching birds for the purpose of tearing out their tongues and putting out their eyes. He became a rapist, regardless of the age or condition of his victims, and a murderer chiefly for the purpose of committing robbery or rape, in all cases showing extreme cruelty. His

reasoning powers were excellent. Hunted like a wild beast, in a thickly settled country, he managed by his adroitness, address, and presence of mind to avoid capture and, when a prisoner, to dupe experienced officials and make good his escape. When recaptured and placed on trial for his life, he recited with the utmost coolness harrowing details of crimes almost beyond belief, and, with a single exception, without the slightest trace of compunction, feeling or the exhibition of any sign which might justify the belief that he knew right from wrong.

The sexual perversions which help form the sum total of moral insanity may be in part due to evil associations and to the example of others, but in many cases there certainly is an inherited tendency which may express itself in some form very early in life, even in extreme youth and without the excuse of an evil example. The indescribable filth of sodomy occurs in this mania.

PARANOIA.

A form of mental disorder resting upon a neuropathic basis, inherited or acquired, usually accompanied with hallucinations and delusions which are more or less systematized. The neuropathic state may be the result of some disease or injury during early childhood. It is an essentially chronic affection and one of slow growth, though betraying all the while more or less clearly the constitutional vice. Sometimes a delirious or maniacal attack may be the beginning of the fixed mental disorder. There are hallucinations, usually of hearing, less often of feeling, seeing, tasting, or smelling. Delusions may be accompanied by hallucinations or depend upon them. The disease practically is incurable. Intermissions are frequent and prolonged, but not complete, the patient usually showing some traces of mental weakening or aberration which he may take considerable pains to hide. After a time, varying greatly in duration, he slowly drifts back into the old condition. Exacerbations also may occur, with considerable cerebral excitement, sleeplessness, sometimes ecstasy, delirium, stupor, etc. Again, the paranoiac may develop some other form of insanity, notably dementia paralytica. The termination usually is in a semi-dementia, in which the patient retains a part of the habits and training of his earlier life and enjoys making himself more or less useful

about the institution in which he happens to be; their condition is described as one of "physical weakness and good-natured stupidity."

Early Paranoia develops in childhood, perhaps at the time of puberty (hebephrenia). It is not easy, usually, at this time to determine anything beyond the existence of the strongly marked neurotic tendency. The child is morbid, full of strange notions and fancies, unhappy, dissatisfied; such a condition, however, presents nothing characteristic, and may exist in those who are merely impressionable and not judiciously reared. Nevertheless, the presence of the strongly pronounced neurotic tendency attaches to such traits a much more serious meaning than they otherwise would have. Later, such children, as they grow into adolescence, are not thoughtful, considerate of others, open-hearted, womanly or manly, but sentimental to the last degree, have an exalted opinion of themselves, and, nine times out of ten, are inveterate masturbators. A state of more or less continuous hysterical excitement is common, and with it a strange and dominating craving to be pitied. To excite commiseration is the chief object of life. I had under observation for a number of years a young girl, the illegitimate child of a woman of low moral tone and of a father who was notoriously intemperate and shiftless. The child had been in charge of the County authorities, but at their earnest request was taken into a quiet, respectable home, with the hope that the girl, who had some pleasing qualities, might be made a useful and good woman. She was at that time about thirteen years old, and appeared to be happy in her new and comfortable home. She keenly enjoyed appearing on the street well dressed, readily adopted good manners, and behaved as well as could be expected. Her chief faults, lying and pilfering showy articles of slight actual value, were attributed to a lack of proper training and were readily forgiven, especially as she seemed thoroughly penitent when confronted with them. During the year, or more, the girl lived in this family she could not be broken of these faults; yet, she seemed so contrite and so passionately grateful that she was pardoned again and again. A great annoyance to her new friends, and one that seemed inexplicable to them, were periods of personal neglect in which the girl, usually fond of being well dressed, appeared slouchy

and dirty. Accidentally it was discovered that she masturbated. She was finally returned to the county authorities because she had nearly ruined the social standing of the family and the business of her protector by telling about town, in stores, on the streets, in the homes of people whom she was allowed to see, the most heart-rending stories about having been cruelly beaten, locked up in the cellar for trifling offenses, and being hung up by the thumbs and kept standing on her toes until almost dead from exhaustion. In making up these stories she showed much judgment; a bruise received on the leg in play would, for instance, furnish the basis for a harrowing tale of abuse, and would invariably be connected with some minor offense on her part of which she had actually been guilty, and which she frankly acknowledged and cited, seemingly for the purpose of mitigating the cruelty practiced upon her. After a quiet but thorough investigation of her stories, she was finally, in the presence of the family and of County officials, asked to explain; she broke down, acknowledged that she had for months told these falsehoods, and finished by throwing herself upon the ground, clasping the knees of her protector, and in the most passionate manner begging forgiveness, and praying not to be sent away. When asked why she had told these falsehoods, she explained that in all her life nobody had ever been sorry for her, and "she wanted people to be sorry for her."

Growing into years of maturity, youthful paranoiacs do not acquire the strength of character which belongs to their years, but remain in a state of incomplete development.

In the so-called *late paranoia*, the eccentric and irresponsible state already described has continued, imperceptibly increasing until a fixed delusion has taken possession of the patient or until after some acute disease which has still further weakened an already enfeebled and unstable nervous system, there suddenly sets in acute mania or delirium. This is usually the delirium of persecution; unlike the melancholic, the paranoiac here is liable to become dangerous. He is conscious of innocence and ready to turn upon his persecutor or persecutors, to defend or revenge himself. Hallucinations precede and accompany this state, usually of hearing, but also of feeling, taste and smell, rarely of vision. The delusion may assume other forms. Thus

he may fancy that his property rather than his person is endangered; if at large, such a person is constantly engaged in law suits, and his animosity toward judges and juries who decide against him may become a domineering passion and lead him into trouble. Or his condition may assume the form of a religious insanity; he may then hear heavenly voices and see visions. In all these forms the sexual element is strongly marked, especially so in the religious type of paranoia, and masturbation is nearly always a ruling passion. If the mental disorder takes a sentimental turn, it is likely to prove an erotic paranoia, a love, almost always returned, for some exalted person, with erotic exaltation and dreams. The religious element may assert itself in connection with this type, and then it gives rise to painfully disgusting fancies of physical love for sainted spirits in whose arms the subject rests all night. Gradually a state of permanent mental enfeeblement obtains, often retaining in a less aggressive form the characteristic delusion. As stated, this class of patients in an asylum are frequently helpful and usually good-natured, although their freaks often render them a source of constant annoyance to those in charge.

PERIODICAL INSANITY.

The distinguishing feature of this form of insanity lies in its occurrence at regular or irregular intervals, with periods of a comparatively normal mental state between the paroxysms. To this form belong the true neuropathic dipsomania, epileptic insanity, menstrual insanity, periodical melancholia. All rest upon a neuropathic basis.

The successive attacks of periodical insanity resemble each other closely, and sometimes are faithful reproductions of the same picture of mental confusion, even to the language employed. They may be preceded by certain vague premonitory symptoms or may be sudden in onset, accompanied with illusions, hallucinations and delusions; there are also present such indications of severe implication of the general nervous system as: congested face and headache, cold hands, palpitation of the heart, sleeplessness, and defective vision. The delirium may be very violent and is often tinged with evidence of sexual depravity; yet, though noisy and demonstrative, the patient may

commit no serious offense. Frequently, however, a morbid impulse asserts itself and becomes an imperative act through the commission of some crime (burning a house; some sexual crime, usually horrible; murder; suicide).

During the interval between the attacks the patient may appear perfectly rational, take care of himself, his family, and his business affairs. But in the long run his condition becomes one of gradual, though not rapid, physical and mental failure, with more or less instability and irritability of the nervous system.

The term *cyclothymia* or circular insanity is used to describe the occurrence of mental disease in cycles which are completed in a few days or in months, the general rule obtaining that the more severe the symptoms, the shorter the cycle. The arrangement of these cycles differs in different cases, but is the same in the one individual case. The cycle may begin with a mania; the patient may then pass through a melancholia, then have a lucid interval. The passage from one to the other is usually gradual, sometimes abrupt. Lucid intervals may be wanting. The paroxysms of mania or melancholia do not in any sense, including lightness or severity, differ from any other attacks of mania or melancholy; it is only the arrangement in regular cycles which constitutes the form or type.

In very light cases the patient may simply be considered moody or irritable and unreliable, on account of the constant change in his mental condition and attitude, since there is nothing in his daily life or conduct to warrant the presumption that he is not sane.

THERAPEUTICS OF INSANITY.

ACONITE. Mental disorders from fright, chagrin, anger, joy, and from over-heating. Great mental anxiety and general high tension, both mental and physical, marked by over-sensitiveness. He is peevish, irritable, malicious; cannot endure music, it drives him wild; fear of a crowd, of the dark, great fear of death. Constant and excessive anxiety. Sleeplessness. Mania with fitfulness; alternately laughs and cries. Symptoms of moderately active congestion; muscular pain and soreness.—**AGARICUS.** Absorbed in his fancies; sings, laughs, talks to himself, answering no question. Confused; can't find the right

word; wants to be let alone. Mental trouble from worry, from mental excitement. Dementia from palsy. Expansive delusion. Melancholia, with tendency to do violence. Epileptic insanity, with frenzied delirium, with spells of religious mania. Great muscular strength; jactitation of muscles; violent spasms, tonic and clonic. Sad, anxious moods; imbecility.—ANACARDIUM. Both mental and bodily operations sluggish. Fearful and apprehensive; thinks he is surrounded by enemies; dull, stupid despair, cowardly, ill-natured, cruel. Hallucinations of hearing; he hears voices which sound to him as though far away. Anthropophobia. Mental trouble in connection with brain-fag. Dementia of old people with rapid loss of memory and mental vigor. He moves about as though half-drunk.—ARGENTUM NITRICUM. Mental and physical prostration; lack of will-power; loss of memory, he cannot find the right word; fancies himself an object of general contempt, his own family included; dreads being alone, gets nervous and must have some one to talk to him; is afraid of being too late; hurried in all he does. Hypochondriasis; melancholia; fixed delusions; predicts time and manner of his death; wants to kill himself, but is too cowardly to do it. Epilepsy; tendency to fall sideways.—(ARG. METALLICUM. Restless; wanders about aimlessly; spasm when entering a warm room from the open air; before midnight; when asleep at night.)—ARSENICUM. Of the greatest value when mental disturbances arise from the exhaustion following bodily disease, overwork, loss of sleep; often from a badly nourished condition of the system, the result of gastric trouble of long standing. The mental condition is one of apprehensiveness, restlessness, uncontrollable anxiety. He is ill-humored and quickly takes exception to everything said or done; he is irresolute, peevish; is afraid of everything; cannot sleep at night and becomes so restless and anxious that he goes from bed to bed trying to find relief. Hallucinations (ghosts, thieves, vermin, bad smells, like sulphur). Religious insanity, with despair. Suicidal mania (hanging?) determined, the desire to kill himself being the result of the actual suffering he undergoes. Characteristic constitutional indications are present, as: exhaustion; quick, irregular, weak pulse; sensation of burning pain in stomach and bowels; burning like fire at the anus; aggravations from being indoors and at night; relief from being

out of doors, from warmth.—**AURUM.** The emotional sphere is greatly disturbed; the mental derangements which call for its use are closely associated with grief, vexation, disappointed love, and similar depressing emotional factors. The patient is tearful, hysterical, vehement, impatient, unstable; he cannot bear sympathy or contradiction; has no confidence in himself and feels that nobody else has, yet he finds fault with everybody; he asks questions, but does not wait for the answer. Inclined to religious melancholy of mildly emotional type, with constant praying. Nervous and easily frightened; the least noise startles him. There is suicidal mania, but it is emotional; while the patient sets about finding means to kill himself, he is irresolute and does not actually accomplish it. With these there is restlessness at night, rush of blood to the head, palpitation of the heart, and, often, violent sexual desire, sometimes almost an amorous frenzy, with frequent pollutions. Vertigo is common. The patient is well nourished; his symptoms are liable to be worse at the full of the moon; he is better in the open air and from out-door exercise. Affections arising from mercurial or syphilitic poisoning, hypochondriasis, melancholia.—**BELLADONNA** is of great value in acute mania. The delirium is furious and accompanied with every symptom of intense cerebral congestion. One of the characteristics of the **BELLADONNA** patient is the frequent and rapid change of mood; one moment he frantically strips himself of every bit of clothing, froths at the mouth, bites, screams and plays the demon; the next he is boisterously merry. There is excessive excitability of the senses; hallucinations of vision are common; he sees dogs, fire, monsters, etc., in the room. Also useful in melancholia with mental dullness, heat of the head, full pulse, sleeplessness, etc. Less often indicated in epileptic insanity.—**CALCAREA CARBONICA.** Limited, largely, to milder forms of mental enfeeblement of a temporary character, resulting in great apprehension of coming evil, including insanity, with ringing and roaring in the ears, offensive smell in the nose, sleeplessness, with horrifying dreams of dogs, corpses and death, general despondency, weakness of memory, bodily feebleness. In women, with characteristic constitutional indications.—**CANNABIS INDICA** is occasionally useful in hypochondriasis, with illusions concerning the state of one's health; he fears that he is going to die or become

insane; watches all his symptoms with anxious concern; gastric derangement, flatulency, cold extremities. Also indicated in puerperal mania with constantly and rapidly changing hallucinations; incoherency; laughs at everything said or done; forgets what she was about to say, so cannot finish the sentence, has no appreciation of time or space; voices sound as though far away; everything appears unreal. Exaltation of mind and high-flowing language.—**CANTHARIDES**. Acute mania with sexual frenzy, not so much due to excitement of the imagination as of the sexual organs; the patient suffers intensely from constant sexual erethism, demanding immediate gratification. Paroxysms of rage, with crying, barking, even convulsions. Frequent micturition, often painful.—**CONIUM**. Melancholia in older people, with inability to endure excitement, to make a prolonged mental effort, to recollect. Weak sexual power, with pollutions; nervous system deranged from continuous sexual desire, the gratification of which circumstances do not permit. Desire for solitude, yet does not want to be left alone. Folie circulaire. Uterine and ovarian affections.—**DIGITALIS**. Exceedingly valuable when the slowness of the pulse in mental disorders is such as to attract attention. There is exhaustion, debility, throbbing headache. The mental symptoms are not characteristic (depression, moodiness, anxiety, weakness of memory, aggravations from music), but it has proved a useful remedy in asylum practice.—**GLONOINE**. Acute mania, with violent headache, with heat, fullness and throbbing in the head, staring eyes, throbbing of the carotids, etc. Expansive delusions; thinks he is God. After exposure to the heat of the sun.—**HYOSCYAMUS**. Intense hysterical excitement, with excessive talkativeness, laughing and singing. Puerperal mania with sexual excitement and fear of being poisoned. Acute mania, with a highly excited state of the sensorium and many abnormal impulses, rage, fury, with exhibition of great muscular strength. Strongly marked convulsive action; pharyngeal spasms, so he cannot drink. Lasciviousness and shamelessness from cerebral excitement. Epileptic insanity.—**KALI BROMATUM**. Acute mania, with sleeplessness, fear of being poisoned, of being pursued, etc. Suicidal mania, with tremulousness and twitching of muscles. Brain-fag, with a sense of numbness in the head and feeling as though he would lose his

reason. Loss of memory, a kind of aphasia in which words and syllables are forgotten and omitted.—*LACHESIS*. In mental disorders in women who are passing through the change of life; melancholic tendency, always looking upon the dark side; changeable, peevish, notional; cannot keep her mind fixed upon anything; continuous mild restlessness, physical and mental. Apprehension of coming evil; fear of death, yet talks about committing suicide; thinks she is dead and about to be buried. Lasciviousness. Mania with excessive talkativeness. Thinks she is under divine control. Sexual desire of cerebral origin, with weakness of the genitals. Characteristic general indications are present, as the inability to wear anything tight about the throat.—*LILIUM TIGRINUM* is very useful in the intense hysterical excitement of the nervous system which occasionally accompanies uterine or ovarian disease. Sexual desire is usually abnormally active and is largely responsible for the coloring of the symptoms. She is rendered wretched by it, and is forced to keep herself constantly employed not to lose control of herself; she is unstrung, "hurried" in whatever she does, and with it unable to fix her mind upon any one thing long enough to accomplish much; the irritability of the nervous system is such that she grows impatient and desperate and is in constant danger of explosions of profane and unbecoming language. Frequently present in such cases is a sensation of bearing-down, as though the pelvic contents would issue from the vulva unless prevented by upward pressure of the hand. There is usually thin, brown, acrid leucorrhœa.—*NUX VOMICA*, though of constant use in the treatment of the insane, finds its most important field of employment, not during delirious or maniacal paroxysms, but during comparatively lucid intervals and in the chronic forms of mental derangement where its action upon the digestive system frequently demands its exhibition. It is particularly adapted to cases in which chronic alcoholism is a prominent ætiological factor and where the disposition of the patient is cross and aggressively irritable. Constipation, hæmorrhoidal troubles and dull headaches are commonly present.—*OPIUM*. Melancholia. Mania. Flushed face, cold extremities, eyes wide open, frightful illusions, giving rise to attempts to escape. Or, after the spasm, unconsciousness; face pale; eyes half-open, glassy; sighing respiration; sopor, with snoring;

profound coma.—**PLATINA**. In mania of women, associated with terrible sexual excitement and expansive delusions. She feels superior to all about her and treats everybody with contempt. Vacillating; now mirthful, in an hour depressed and tearful. Thinks she is going to die. Great præcordial anguish. Frightful illusions; sees ghosts. Numbness, coldness in the extremities; sensations of "crawling" here and there; menorrhagia; characteristic gastric symptoms. Constipation. Puerperal mania.—**STRAMONIUM**. Resembles **BELLADONNA** and **HYOSCYAMUS**, but has less cerebral congestion and is marked by a greater tendency to incessant talking. There is constant talking, laughing, and singing. He has wild delirium, with terrifying hallucinations, hence frantic attempts to escape. Constantly afraid that harm will be done him; does not want to be let alone in the dark. Melancholia; afraid he will die; thinks he will be damned. Complains of sensation of lightness in the head. The face is red and bloated; the eyes staring, with dilated pupils which are insensible to light; lips and tongue tremulous; difficulty of swallowing; convulsive twitching of limbs; suppression or involuntary escape of urine.—**VERATRUM ALBUM**. Mania and melancholia with stupor. Feels that he has committed a great crime; will be damned eternally. Delirium of grandeur; delusion of being afflicted with loss of sight and hearing; thinks she is pregnant or in labor. In melancholia; utterly hopeless; sits in a chair, the head sunk upon the chest, paying no attention to anything, answering no questions, taking neither food nor drink unless forced upon her. Fainting-spells. Pulse weak, intermitting; face pale, nose cold and pointed, cold sweat on face and forehead; eyes sunken, with dark circles around them; bodily surface cold and bluish.—**ZINCUM METALLICUM**. Thinks he has committed a great crime and is about to be arrested for it; tries to commit suicide in order to escape the consequences. Melancholia; lethargy; tendency to twitching of muscles and convulsions; paralytic numbness and weakness in the extremities. Chorea. Locomotor ataxia. Epilepsy.

Consult also: **AGNUS CASTUS**, **ASA FÆTIDA**, **CAUSTICUM**, **CICUTA**, **CIMICIFUGA**, **COCCULUS**, **CROTALUS**, **CUPRUM**, **GELSEMIUM**, **HELLEBORUS**, **IGNATIA**, **LAUROCERASUS**, **MOSCHUS**, **NAJA**, **NATRUM MURIATICUM**, **ŒNANTHE CROCATA**, **PHOSPHORUS**,

PICRIC ACID, PLUMBUM, PSORINUM, PULSATILLA, SEPIA, STANNUM, SULPHUR, THUJA, VERATRUM VIRIDE.

Any of these may be found indicated by their close relation to the primary physical cause of the mental derangement or by their ability to relieve or remove bodily ailments which directly or indirectly aggravate the mental condition of the patient.

GENERAL AND FUNCTIONAL DISEASES.

NEURASTHENIA.

Neurasthenia (Beard), Nervous Weakness, Nervous Irritable Weakness, is simply an exhausted condition of the nerve centres which does not depend upon organic disease. In very many cases a predisposition to such a state is inherited from parents who themselves are of a neurotic tendency; in others it is acquired, usually early in life, by privation, overexertion or, oftener, by vicious habits, as masturbation. Whatever lessens nerve-force must be considered a predisposing cause of neurasthenia. Given a state of enfeeblement of the nerve-centres, no especial harm may come if in after-life no demands are made upon the subject beyond those which the state of his nervous system allows him to meet; when the demands made are larger than can be met, a "crash" results, the expressions of which are all grouped under the term neurasthenia. The immediate cause, usually, is overwork—the term being used relatively—particularly under unfavorable circumstances, such as anxiety about family affairs or business matters.

Symptoms.—Neurasthenia, like its first cousins hysteria and hypochondriasis, is a complex condition and presents a great variety of symptoms. In the larger number of cases certain local symptoms stand out with sufficient prominence to attract special attention, constituting types; hence the recognition of cerebrasthenia, spinal neurasthenia and sexual neurasthenia, all these in the main resembling each other, but each characterized by particular prominence of symptoms within a certain sphere.

The affection is insidious in its development. Occasionally some particular occurrence, as an attack of vertigo, is the first

indication that serious trouble has commenced. If careful inquiry is made, it is found that the patient for some time has experienced weariness of body and mind, inability to perform the daily tasks of business, difficulty in attending to the small duties of life, or in fixing the attention, in adding sums, in attending to correspondence, and in getting refreshing sleep at night. In *cerebrasthenia* these are particularly marked; there is much irritability, impatience, moodiness and mental depression. Often the head feels full, with a pressive, clamp-like pain, frequently in the occipital region; but headaches are by no means constant. For a long time, when the mental symptoms are quite pronounced, there is ability to endure considerable physical exertion, and it is not uncommon to experience relief of mind from manual employment; but soon the patient tires easily and cannot be induced to exert himself. Weakness of sight is common, the eye tiring easily, and sleeplessness eventually, in the greater number of cases, becomes habitual. In the so-called *spinal* neurasthenia (spinal irritation) there may be, in addition, considerable aching and sense of lameness in the back, often with tender spots along the spine, easily discovered by pressure. Weariness and weakness of the legs is at times excessive, with a feeling of weight as though they were too heavy to be dragged along. Aching in the legs, numbness, and tingling are common. The tendon reflexes are increased. There is vaso-motor weakness, as shown by flushing of the face, waves of heat all over, sometimes excessive sweating from slight causes. In many cases the hands and feet are constantly cold and damp, and there may be night-sweats. There is also irritability of the heart, with a tendency to palpitation and shortness of breath. The pulse is rapid, irregular, intermittent, easily upset. Arterial throbbing may be visible almost as plainly as in aortic insufficiency, and forcible pulsations in the epigastrium may suggest abdominal aneurism. In *sexual neurasthenia* the mental condition is one of great depression and cowardly apprehensions of all kinds. Sexual weakness is pronounced, and the patient keeps himself in a state of misery by habitually contemplating the hopelessness of his condition, as it appears to him. Lack of power to perform the sexual act often results from sheer apprehension of failure, and completes his abject wretchedness.

Atonic dyspepsia, itching, formications, sensory disturbances, liability to periods of hysterical excitement or depression, and in many cases frequent and severe attacks of neuralgia, are usually present. The urine is concentrated and scanty, and symptoms of lithæmia may be conspicuous. The patient may be worn and haggard; often, however, neurasthenics are in good flesh; in fact, some of the worst cases I have seen were well-nourished and to the casual observer would have appeared anything but the wreck they were.

The diagnosis is easily made. It rests largely upon negative evidence, i. e., the absence of organic diseases, as of the heart.

The prognosis is favorable, recovery under proper treatment being the rule, even though the successful management of a case requires much tact and patience when there is great mental depression and sexual weakness.

Treatment.—If the physician is consulted when the patient is still able to be about and is conscious of the overdraft he is making daily upon his strength, and of the results likely to follow, the treatment is simple and efficacious when honestly carried out. It consists of affording the nervous system rest by spending an hour, or two, daily in open-air exercise, preferably on the wheel, boating, or, if accustomed to the saddle, horseback riding, with cold shower baths in the morning, followed by brisk rubbing, a good nourishing diet, and a few weeks passed in the country.

But most cases do not come under medical care until far advanced, and then they are much more difficult of management. Here, as in the treatment of the early stages of mental disorders, the success of treatment will depend largely upon tact on part of the medical man and upon his ability to show a kindly and honest sympathy without yielding in firmness. This applies particularly to the sexual neurasthenic, who in reality often is a great sufferer. In such cases, after listening to the patient's familiar story and assuring him of the sympathy which he has a right to claim, I believe it to be the part of wisdom to assure him in the plainest terms possible that it is in his power to get well, certainly to make very material improvement, *if he cares to get well* and will follow directions implicitly and to the very letter; but that treatment is a waste of energy, time, and money unless he will honestly second every

effort of the physician and endeavor to help himself by the use of common sense and pluck.

Rest must, first of all, be secured; to this end absence from business, with an out-door life, is of the greatest importance. In seeking to provide this, it must be remembered that the patient demands to be agreeably entertained and must not be allowed to get lonely or tired. The temptation, in case of well-to-do people, is to seek rest in travel; usually, with Americans, this means a frantic rushing from place to place, to return home, after a few weeks' absence, in a condition of exhilaration, soon to relapse into a worse state than that for which relief was sought; occasionally the disastrous results of such folly overtake them on the journey. The only way in which benefit may be had from travel is to avoid large towns and popular resorts, and spend a few weeks or months in a quiet, healthful spot, if possible in the open air, resting a good portion of the time, and taking just enough active exercise to maintain a good appetite for plain food and to insure restful sleep. The particular spot selected should, if possible, afford such opportunities for indulging in out-of-door sports (fishing, hunting, sailing, etc.) as the patient likes.

In very bad cases the so-called "rest cure," consisting of absolute rest in bed, forced feeding and passive exercise, continued from three to six weeks, promises much; it at least will give the patient a start when other means fail, and under continued medical care will make a permanent cure possible. This treatment is best obtained in some private institution, such as can now be found throughout the country. It may, however, be had at home, if circumstances are favorable. To be successful, there must be absolute isolation of the patient from his friends and constant attendance of a capable, experienced nurse. The diet is to consist chiefly of milk, given at frequent intervals, later varied as circumstances justify; meat must be excluded, but after a time meat-broths may be allowed. The aim is to give all the food the patient can bear without deranging stomach or bowels. Massage is to be administered daily, and ability to do this skillfully is one of the necessary qualifications of the nurse. Electricity (faradism) must also be used daily. Each muscle of the extremities and trunk must be firmly contracted by applying the poles to the motor points of each

muscle, using a slowly interrupted current for about thirty minutes; then general faradization is had by applying one sponge electrode to the nape of the neck, the other pole to the feet. A rapidly interrupted current of fair strength is thus used for 15 to 20 minutes. The electrical treatment should be rapidly withdrawn after some weeks, but massage is to be kept up for a considerable length of time.

The selection of remedies, here as in all functional diseases of the nervous system, requires unusual care in the study of minute symptoms and close familiarity with the *materia medica*. The following hints may prove of service:

AGARICUS. Weak, irritable, anæmic spine, very sensitive to touch, usually with sharp, sticking pains; muscular twitchings. Neuralgic pains in different parts of the body, sharp and sticking or lightning-like. Severe neuralgic headaches, in a small spot, as though a nail were being driven into the head. Irritable heart from the use of tobacco, tea, coffee. Numbness and formication in the extremities. Great sexual desire, with relaxation of the male organ and great exhaustion following an embrace. Urine voided in small amounts.—**AURUM.** Melancholia; cardiac oppression; palpitation of the heart; irregularity of the pulse; severe headaches, as though the cranium were involved, with pressure outward, fullness and roaring in the head, much worse at night. Suspicion of syphilis. Old people.—**CALCAREA CARBONICA.** An excellent remedy when its peculiar constitutional indications are present. Patient is usually of fair complexion, large, flabby; easily tired from exertion, even though he appears well nourished. Sluggishness of functions; perspires easily and copiously; his feet are cold and damp. Memory seems to fail; heat in the head from any intellectual effort; fears he is losing his mind; easily confused; obstinate. Characteristic indigestion is often marked.—**CHINA.** Anæmia from loss of fluids. Exhaustion which results from sexual excesses. Low-spirited, gloomy, disinclined to make any mental effort. Profound apathy, or great irritability, with weakness. Rapid emaciation, with voracious appetite, indigestion, night sweats. Intense throbbing, anæmic headaches, with hammering and beating in the head, roaring in the ears, hardness of hearing, Spine irritable, sensitive to touch; sharp pains radiating from the spine, chiefly into the head.—**COCA.** Given in

physiological doses, it has proved valuable when there is general atony of the system. Cannot eat, sleep, or do any bodily or mental labor because he is too weak. Atonic dyspepsia. Weakness of the heart; it palpitates from slight cause; oppression at the heart; both palpitation and oppression brought on readily from gastric flatulency. His weakness shows itself even in his voice. Cannot rest anywhere. He goes to bed completely tired out, but cannot go to sleep.—**COCCULUS**. Nervous exhaustion with heaviness and numbness of the entire body, especially the legs; spinal irritation, with hyperæsthesia of all the senses; stupid; slow of comprehension; cannot find the right word to express himself. Vertigo, with stupid, heavy feeling in the head, often with great sickness at the stomach, total aversion to food, vomiting; intestinal flatulency. Melancholia. Cannot bear the least excitement. Ill effects of long-continued inability to sleep. Spells of overpowering sleepiness.—**GELSEMIUM**. Great loss of muscular power; trembling from any exertion, as walking or playing on the piano. Neuralgia, with loss of power in the affected parts. Great weakness of the sexual organs; emissions without erections. Frequent headaches with dizziness, confusion and sense of heat in the head, blurred vision, cold feet, muscular unsteadiness.—**IGNATIA**. Particularly useful in cases where there is a tendency to hysteria; the erratic, contradictory character of all the symptoms is well marked. Extreme sensitiveness to pain. *Clavus hystericus*. Characteristic indigestion with craving for indigestible articles, "sinking" sensation at the epigastrium, great flatulency. Copious urination, especially during and after periods of emotional excitement. Melancholia. Sharp, stitching pains in the spinal cord, sometimes like lightning in suddenness of appearance and in severity.—**KALI BROMATUM**. Brain-fag, with heaviness and numb feeling in the head; thinks he will go crazy. Cerebral anæmia, with coldness of feet; melancholia, irritability, hysterical weeping. Loss of memory, impaired coördination, numbness and tingling in the extremities, resulting from sexual excesses.—**NATRUM MURIATICUM**. Brain-fag, with impaired memory, anæmia, depression of spirits, palpitation and sense of coldness about the heart; inability to fix the attention; melancholia; irritability, with paroxysms of weeping; hopelessness; chilliness; restlessness. Headache, usually frontal, some-

times occipital, in the morning, on waking. Backache; the back feels as though broken; paralytic weakness of the legs. Sense of weakness at the stomach; weakness in the abdominal muscles. Characteristic constipation.—*NUX VOMICA*. Patient is easily fatigued, both in mind and body; must often lie down and rest. Indescribable anxiety and nervous tension which gives him no rest, especially after being up late at night. Passionate, jealous, easily angered disposition. Characteristic headache, gastric and intestinal symptoms, especially in habitual drunkards; atonic dyspepsia; constipation; hæmorrhoids. Lumbago; back sore and bruised. Spinal irritation, with paralytic weakness in the legs, which go to sleep easily, feel cold, appear bluish. Numbness and formication in the spine. Aggravations from being up late at night and from mental exertion; relief from sleep, but great aggravation from broken sleep.—*PHOSPHORUS*. Great mental and physical exhaustion, with trembling in the limbs from weakness, and vertigo. Brain-fag, with sense of weariness and of coldness in the cerebellum. The brain is tired as though it never would get rested. Weariness and painful sensitiveness in the lower spine. Spinal irritation with burning pain between the shoulder blades. Ataxic symptoms. Mental effort is followed by shocks in the head. Paralytic feeling in the legs, causing awkward, stumbling gait. Weakness of the sexual organs; yet, he is burning up with sexual passion, has voluptuous, erotic dreams. Has an exalted opinion of himself.—*PHOSPHORIC ACID*. Exhaustion of the cerebro-spinal nervous system from overwork; is not able to make any mental effort, it exhausts him so completely; the hair turns gray early and falls out. Effects of mental shock and grief (disappointment in love). Remarkable weakness of the sexual organs, usually from excessive indulgence, with weakness and burning in the spine, paralytic weakness of the legs, and escape of seminal fluid from the relaxed genitalia during sleep or after urinating. Spinal anæmia from sexual excess, with pain in the vertex, palpitation of the heart, impotency, etc.—*PICRIC ACID*. Brain-fag; every attempt to perform mental labor brings on severe, throbbing headache at the base of the brain and complete letting-down of the whole system. Great weakness of the back, bodily weariness, paralytic heaviness of the legs. Loss of sexual power. Frequent seminal emissions, followed by general

exhaustion and aching at the base of the brain.—**PLATINA**. Indicated in rare cases by characteristic sexual symptoms, i. e., satyriasis and nymphomania, with profound melancholia, associated with notions of grandeur, and inability to find sleep, due to the general nervous excitement.—**SELENIUM** has given good results in the treatment of the exhaustion following sexual excesses, particularly of older men; voluptuous dreams, with quick emission of thin seminal fluid, followed by backache and great prostration.—**SULPHUR** may in rather exceptional cases be called for by persistent constipation, with dryness and irritability of the rectum, burning soreness at the anus, congestive headache and engorgement of the liver. Its mental condition is one of irritability, sometimes with periods of mental indolence. Religious melancholia; abdominal plethora.

Consult also: **ÆSCULUS**, **ANACARDIUM**, **ARGENTUM NITRICUM**, **ARSENICUM**, **CALCAREA PHOSPHORICA**, **CIMICIFUGA**, **COFFEA**, **GRAPHITES**, **PLUMBUM**, **PULSATILLA**, **SILICA**, **ZINCUM**, and the remedies discussed under "Hysteria."

HYSTERIA.

A disordered condition of the nervous system in which there is exaltation of the emotional nature and depression of the will-power, giving rise to a perplexing variety of functional derangements which often closely resemble organic disease, but are not found to rest upon visible anatomical changes. It has been termed a psychosis. According to Moebius, it is a state in which ideas control the body and produce morbid changes in its functions.

Ætiology.—Hysteria is very largely a disease of *women*, or rather of females, chiefly because of the greater sensitiveness of their nervous organization; many cases, however, occur among boys and men. It usually appears near the age of puberty, but is often seen much earlier and quite late in life. *Race peculiarities* and *civilization* are important factors. The Latin races, on account of their more highly developed emotional nature, are oftener the victims of hysteria than the more phlegmatic and self-contained peoples, like the English, and the affection assumes among them a far more serious aspect than it does among, say, the Teutonic races. The artificial life of a highly civilized people also favors the development of

hysteria; it is practically unknown among savages. The effect of heredity is unmistakable. The children of neurotic parents, of persons who are epileptics, neurasthenics, insane, or sufferers from other forms of nervous disease, furnish a very large proportion of victims. In many cases a false system of education either helps develop this tendency or creates a predisposition to it. The long hours of study in the close school-room; the lack of abundant exercise in the open air; the silly "babying" to which many children are accustomed; the development of a prematurely active and, usually, false emotional life which of recent years has become the fashion; the fostering of social ambitions at a time of life which should be devoted to sound educational purposes and to the building-up of a vigorous body; the unwillingness to have children and young people realize the necessity of bearing responsibilities and burdens,—all these prepare the subject for disorders of which hysteria is the most common expression. Proper training, especially the enforcement of implicit obedience to the commands of parents, has a tendency to repress and eradicate a predisposition to these affections. Whatever weakens or unduly tires the nervous system may excite hysteria; here belong over-work, pain, depressing emotions and violent excitement, any one of which by one grand psychical storm may suddenly terminate in a severe paroxysm, or by a long series of less violent emotions may undermine and finally break down an already enfeebled nervous system. Physical causes, as an injury or the weakness resulting from severe illness, may have the same effect.

Epidemics of hysteria are not uncommon; they have swept over large territories of country and, especially in the middle ages, have helped make history.

Symptoms.—All writers acknowledge the great difficulty of presenting a clear, concise, and yet reasonably complete picture of this many-sided affection.

Convulsions occur in a large number of cases; of these, two forms are recognized: the *minor* form and the *major* form. The *minor form* of convulsive hysteria usually results from emotional excitement. It is frequently preceded by a "warning" or aura, consisting of more or less painful sensations arising from the pelvic, abdominal or thoracic region, or by a constrictive

sensation in the throat, or the sensation as of a hard ball rising in the throat (*globus hystericus*). Sometimes no premonitory symptoms are experienced, the patient suddenly falling to the ground, not with the absolute unconsciousness and utter helplessness which characterizes an epileptic seizure, but evidently with sufficient lingering discernment to avoid bodily injury from the fall. The spasms are clonic oftener than tonic; the movements are varied and complicated, frequently showing a considerable measure of coördination; the head and arms are thrust about in a disorderly, irregular manner, and there may be lateral, "to-and-fro" movements of the trunk and hips. Sometimes there is persistent rigidity of the body, which in exceptional cases may continue for several hours. As the convulsive action ceases, emotional excitement is manifested and consciousness gradually regained. In some cases the emotional excitement is violent, the patient laughing and crying almost at the same time. During the attack flatulent distension of the abdomen is common; after it has passed, there is usually copious emission of limpid, colorless urine. The patient, if closely questioned, shows that he remembers much of what has taken place. After a severe paroxysm the patient may sink into a state of drowsiness which becomes almost a stupor, so that he is roused with difficulty; occasionally this terminates in a trance or in catalepsy. Exceptionally, particularly in children, odd cries are emitted, like the sounds made by animals (as the barking and snarling of dogs), and when these are accompanied with attempts to bite, the attacks somewhat resemble hydrophobia ("spurious hydrophobia") from which they are, however, easily recognized by the presence of this "beast-mimicry," which is characteristic of hysteria.

Major attacks (hystero-epilepsy) are usually preceded by an aura, as faintness at the stomach, dizziness, sensation of distress at the heart, palpitation, or *globus hystericus*; in other cases the patient complains of excessive intestinal flatulency or gives warning of an approaching seizure by abnormal behavior or hysterical excitement. The seizure itself begins by loss of consciousness, the patient falling to the ground in the half-guarded manner which has been described. A violent tonic spasm occurs, continuing from one to three minutes, the patient lying perfectly rigid, with the arms extended or lying by the side and

the toes pointed outward. The face is bloated and livid, the veins turgid, and respiration arrested; the condition is one closely resembling epilepsy. The tonic spasm usually continues from one to three minutes, and is followed by violent clonic convulsions, with frothing at the mouth. Opisthotonos is seen in some cases, sometimes so pronounced that the head is curved backward far enough to have the upper part of the body rest on the face, while the lower portion is supported by the toes. Severe clonic spasms may alternate with opisthotonos. Gradually relaxation takes place and the patient falls into a condition of exhaustion. Succeeding this, there is a stage of emotional excitement in which the patient assumes an attitude expressive of some profound emotion, "posing" with all the effectiveness of an accomplished actress. She may, for instance, remain for some time in a position expressive of religious ecstasy or of penitence; here the so-called "posture of the crucifix" is frequently seen. Commonly there is a passing from one emotion to another, each manifested by fitting attitude and expression; thus fear, anger, penitence, erotism may succeed each other and each be eloquently interpreted by posture and gesture. Hallucinations are frequent here, and may continue for some time after all motory disturbances have ceased; they are chiefly hallucinations of sight (visions) and hearing, and are correlated to the dominating emotion. It is not rare at this time to have charges made by the subject against others, usually referring to some alleged impropriety of conduct; this is the more serious in its possible consequence since the hallucination upon which these charges rest may persist after complete recovery from the seizure. Delirium, bordering upon mania, has been observed in cases where the neurosis is strongly pronounced; its occurrence constitutes a very serious feature of the case and renders the prospect of a permanent cure more than doubtful.

The major form of convulsive hysteria is observed much oftener in France than in this country. It was made the subject of very careful study by Charcot and his pupils, who have furnished elaborate studies of it under the now freely used term *hystero-epilepsy*. This term is suggested by the resemblance of a major attack to an epileptic fit, from which it chiefly differs in its longer duration. Taking the hysterical attack as

a whole, it may last several days, the convulsions recurring at varying intervals on successive days; such a condition in true epilepsy, with no clear-cut periods of recuperation, would be highly dangerous to life.

The attack having passed, the patient may sink into a state of *narcolepsy*, characterized by great drowsiness, or into a *trance*. In the latter, the subject lies in complete repose, with pale face, eyes opened or closed, at times scarcely perceptible tremors of the eyelids and eyeballs, largely dilated pupils, sensitive to a powerful light, with rapid and light pulse, and usually quiet respiration, sometimes so light that movements of the chest-wall can only be discovered by careful watching. There may be muscular relaxation or rigidity; if the former, spasmodic contractions may take place from time to time. In well-pronounced cases there may be anæsthesia of the common and of the special senses, and the subject lies insensible to pinching, pricking, great heat or cold. Usually the patient can be fed without trouble, digestion is good, and bodily nutrition excellent. The stools are scanty and passed at long intervals; urine is voided involuntarily and in small amounts. In other cases artificial feeding becomes necessary, and if the trance is of long duration, great emaciation may result. The temperature, in protracted cases, eventually becomes subnormal. The duration of a trance varies from a few hours to several days; the condition resembles death, and in the absence of skilled judgment may be, and has been, mistaken for it. The awakening is sudden or gradual, with reëstablishment of circulation and respiration. Sometimes the patient awakens for a brief time only to pass into another trance.

Catalepsy may occur during a state of profound lethargy or, exceptionally, as the immediate result of powerful emotional excitement. It is characterized by the loss of voluntary movement of the muscles which remain indefinitely in any position in which they are placed. The patient lies in a trance-like condition, the face either placid or expressive of the emotion felt at the time when she passed into this state, with open eyes, regular respiration and pulse, normal performance of the functions of the body, but with complete anæsthesia of the common and special senses. Liquids are taken readily. The duration of hysterical catalepsy is very indefinite; the patient may awaken,

take nourishment, and at once relapse; or she may remain in the cataleptic state for days, months, and even years.

The *non-convulsive* form of hysteria possesses features equally striking. *Hysterical paralysis* may come on gradually or suddenly as the result of violent emotional excitement (fright). It is essentially a paralysis of the will, the patient having "lost the power to will a contraction of the affected muscles," and it may resemble any form or type of organic paralysis. *Hysterical paraplegia* is the common form. It is not absolute; the feet are usually extended and turned inward, there is no wasting of muscles, the electrical reactions are normal, there is lessened or abolished sensibility, disturbed muscular sense, normal or abnormal knee-jerk, sometimes spurious ankle-clonus. *Hysterical hemiplegia* is rarely complete; it usually affects the left side in preference to the right; the leg is involved oftenest, the neck not uncommonly, the face never when the case is of hysterical origin; sensation on the affected side is lessened or lost. *Hysterical monoplegia* may be facial, crural, or brachial. *Hysterical paralysis of the vocal cords* is not rare; it results in hysterical aphonia, which exceptionally may become permanent and complete. *Hysterical paralysis of the pharynx and œsophagus* is infrequent.

Hysterical contractures are caused by powerful tonic muscular contractions; they may occur alone or in connection, chiefly, with paralysis and disorders of sensation, especially anæsthesia. They develop suddenly or slowly, persist indefinitely, and disappear rapidly. The extremities are oftenest affected, particularly the arms, which may be flexed at the elbow or wrist, the fingers strongly closed upon the thumb, which rests in the palm of the hand. If in the leg, the foot is inverted and the toes firmly flexed; there is ankle-clonus. Such cases strongly suggest lateral sclerosis, from which it may be difficult to distinguish them. The muscles of the trunk, hip, shoulders, neck, rarely the jaws or tongue, may be involved. Phantom-tumors in the abdomen, particularly in hysterical women at the climacteric period or after the menopause, suggesting pregnancy, are caused by contracture of the abdominal muscles and of the diaphragm; these phantom tumors disappear promptly under complete anæsthesia.

Clonic spasms are frequent. They are characterized by a

rhythmic movement which is suggestive of chorea. They may involve the arms, giving rise to rhythmic flexion and extension, more rarely to pronation and supination, or the sternocleido-mastoid, or the muscles of the jaws, or the rotary muscles of the head, or the psoas muscles of the leg, lifting the leg in rhythmic manner from six to ten times in the minute, or the muscles of the trunk, causing the patient to bend forward as though making a series of bows (Salaam convulsions), or the muscles of the back, forcing backward movements. Other rare forms are described.

Hysterical *tremors* usually affect the hands and arms, more rarely the head and legs. They may occur alone or in connection with paralysis and contractures.

Disorders of sensation belong to the most important characteristic symptoms of hysteria which are comprised under the general term "hysterical stigmata." *Hysterical anæsthesia* is common. It may affect the skin and partake of the nature of analgesia, which is essentially a manifestation of hysteria. Such patients may run a needle deeply through a fold of skin without experiencing pain. Anæsthesia may be general, but usually it is localized and the affected area is bounded by normally sensitive skin; again, spots of hyperæsthesia may occur within an anæsthetic area, the hypersensitive spots (region of groin, ovary, dorsal, lumbar, lower cervical region) being superficial or discovered only on deep pressure. Anæsthesia usually affects one-half of the body (hemianæsthesia), and the dividing line between the normal and affected half is distinctly defined. The affected surface usually is pale and may not bleed from the infliction of slight wounds such as usually give rise to bleeding (*ischæmia*); this feature was distinctive of several epidemics of hysteria during the middle ages and was thought of miraculous origin. Changes in the sensibility to temperature, pressure, or other external influences, may or may not be present; thermo-anæsthesia is common. In many cases the deeper subcutaneous tissues are involved, with resulting loss of muscular sense.

The organs of special sense are often affected, especially the eyes. Indistinct vision is a frequent symptom of hysteria, limitation of the visual field arising from anæsthesia of the peripheral portions of the retina. Loss of the color sense (hysteri-

cal achromatopsia) is also occasionally seen, the perception of certain colors disappearing gradually and in the order given, i. e., violet, green, blue, yellow; the intermediate tints also fade away, and finally all objects appear of a sepia tint. There may be loss of hearing, sense, smell, and taste, though not complete.

Duchenne pointed out that in these cases there may be a cataleptic state when the eyes are closed; that is, inability to move a muscle—say, the muscles of the arm—when the eyes are closed, although perfectly able to do so when the eyes are open; the explanation of this phenomenon is probably psychical.

Hysterical hyperæsthesia is one of the most common symptoms. It may occur in one definite spot or in areas of varying extent. Its distribution is irregular. Great sensitiveness and pain are characteristic. Here belongs *clavus hystericus*, an intense pain usually over the sagittal suture, sometimes in the occiput, the patient complaining of a sensation as though a nail were being driven into the head; other illustrations are: excessive tenderness of the female genitals, with loss of sexual desire and vaginismus; swelling and painful tenderness of the female breasts, with sharp neuralgic pains which frequently extend down the arm; swelling and severe pain affecting the larger joints; pain in the back, with great sensitiveness, limited to certain spinous processes; or diffuse, sharp pains in the abdomen, in certain spots, resembling the pains of gastralgia, gastric ulcer, peritonitis or, more rarely, appendicitis. The special senses may be affected. Photophobia is quite common and often very persistent. Hearing, taste and smell frequently are very acute.

Cardiac irritability occurs in many cases and is expressed in violent, distressing palpitation from even slight emotional excitement. There may be with it severe pain, shooting down the arm, like that of angina pectoris; according to H. C. Wood, this is oftenest seen in the hysteria of young men. Flushings, with hot spells and often profuse sweating, are observed chiefly in women at the climacteric period. Vicarious menstruation (bleeding from nose or stomach) is observed in young girls. Stigmata or hæmorrhages in the skin have undoubtedly occurred in rare cases, though here, as in instances of exceedingly high bodily temperature, a strong suspicion of fraud may always be entertained.

Respiration is often very rapid, without marked increase in the rate of the pulse. *Dyspnœa* is frequent. A "catching" of the breath at every fourth or fifth inspiration occurs in a great number of cases. *Aphonia* from involvement of the muscles of the larynx has been mentioned. There may be violent laryngeal spasms, simulating *laryngismus stridulus*. The sounds which resemble those produced by animals, as barking or mewling (*beast-mimicry*), result from violent inspiratory or expiratory efforts. There may be persistent hiccoughing, often continuing for a long time. The so-called hysterical cough is a hoarse, croaking, exceedingly unpleasant laryngeal cough, frequent in young girls; *cynobex hebetica* is a term used by Sir Andrew Clark to describe a similar cough in neurotic young boys, lasting about a minute and recurring often.

The *digestive system* is nearly always disturbed. There is more or less gastric and intestinal flatulency, with a striking tendency to persistent and painless regurgitation of food, which may continue for years without any apparent ill results. Hysterical spasms of the œsophagus may render swallowing difficult and cause rejection of the food before it reaches the stomach. Hysterical vomiting also is frequent and persistent, and may eventually result in *anorexia nervosa*, a condition in which absolute loathing of food exists, the patient unconditionally refusing to eat and experiencing severe suffering on the approach of food. This condition is seen in the so-called "fasting girls" who occasionally attract public attention. Extreme emaciation and weakness develop in due time, with death from exhaustion, unless the patient can be kept alive by forced and artificial feeding. Recovery of these cases may occur from a change of surroundings or under the Weir Mitchell treatment. Sometimes hysterical vomiting is followed or accompanied by intestinal peristalsis, resulting in vomiting of fœcal matter.

Intestinal flatulency is often severe; it may be associated with spasmodic contraction of the abdominal muscles, giving rise to strange noises which to sensitive people are a source of great affliction (Küssmaul's "peristaltic unrest"). Constipation is the rule, and may be exceedingly stubborn from loss of muscular power, an immense amount of fœcal matter accumulating in some extreme cases where the bowel had not been emptied for two, or more, weeks. *Diarrhœa* is not so frequent, but

may be very intractable, evacuations occurring whenever food has been taken. In other cases, occurring less often, the rectum may be very irritable, and scybala may be forcibly ejected several times during the day. Pain in the rectum, as from fissure, and spasms of the sphincter ani have been noted.

The *temperature* usually is normal. Fever, however, is often present. It may appear without other disturbances, and is then not easily recognized as hysterical; or it may be associated with various manifestations and deceptive local disturbances; again, it may run a course of several weeks, with disturbances of nutrition, resembling typhoid fever or assuming the type of an intermittent. Cases of slight feverish excitement, with cough and bloody expectoration, have been observed. Instances are reported of remarkable hyperpyrexia, the temperature reaching 120°, or more. Fraud has been proved in some of these cases, while others, though as yet unexplainable, must be accepted as authenticated.

Hysterical joint affections are a perplexing feature of hysteria. The joints usually affected are the knee and the hip. The joint is very sensitive, swollen, and fixed; it cannot be touched or moved without much suffering. Occasionally there is wasting of the soft tissues about the articulation, increasing the appearance of swelling in the joint itself. The surface temperature is usually above normal. It is probable that the local trouble is due to inflammatory action outside the capsule of the joint, brought on by some slight injury.

Sweating is frequent, and sometimes the perspiration is slightly tinged with blood (*hæmatidrosis*). The *urine* is generally light-colored, limpid and copious, especially during recovery from a violent paroxysm. Sometimes *anuria* persists for a long time and seriously interferes with the excretion of the urinary solids.

The *mental symptoms* are those of a perverted moral nature with a weakened will. The patient thinks only of self and of making "self" the centre of the world in which he, or she, moves. To absorb the attention of others, infinite pains will be taken. She will exert herself to the utmost to be agreeable or fascinating; she will exaggerate slight ailments or troubles to command general sympathy; if neither ailments nor troubles exist, they are manufactured to order, for the hysterical patient

easily learns to resort to deceit and falsehood. This perversion of the moral sphere strongly partakes of the elements of insanity, and for practical purposes must be so considered.

Prognosis.—With the exception of rare cases of severe hysterical vomiting, no danger whatever exists to life. The prospect of a permanent recovery is best when the patient is young, and since almost one-half of all the cases occur between ten and twenty years of age, there is in the majority of them reasonable hope of a permanent cure. The outlook is not good in severe cases of hystero-epilepsy or in other severe forms of hysteria which occur in adult life, usually from trauma.

Diagnosis.—In the majority of cases it is not difficult to recognize hysteria. A careful inquiry into the history of the patient, including the possible existence of a neurotic tendency, previous manifestations of an hysterical character, and the mental condition of the patient, must first of all be made. The presence of globus hystericus, emotional excitement, crying and sobbing, and, in case of convulsions, the absence of injury from falling, the purposive movements during the spasms and the prolonged duration of the attack itself, are practically sufficient to establish the diagnosis. The variable, shifting character and the association with anæsthesia establish the identity of hysterical *paralysis*. In hysterical *contractures* the character of the deformity may be suspected from the presence of other manifestations of hysteria; they disappear under complete anæsthesia; the reare areas of anæsthesia; the visual field is retracted.—In hysterical affections of the *joints* a general hysterical condition is likely to exist; the muscular rigidity may often be overcome by moderate force employed while the attention of the patient is diverted to some other matter of interest; the contracture yields during sleep and under slight anæsthesia; the atrophied muscles respond normally to electric stimulation (faradic current). Care must be had not to mistake hysterical spastic paraplegia for lateral sclerosis.

Treatment.—The entire subject of prophylaxis is embraced in a sensible, judicious bringing-up of children who have inherited a neurotic tendency. Both body and mind must be properly trained. An abundance of out-door life, with all the play or exercise the child can bear without being taxed, long hours of sleep, plain and nourishing diet, warm and sensible clothing,

and regular hours of study, at no time sufficient to become burdensome, yet enough to occupy the mind and insure intellectual growth, are of supreme importance. The management should be wise; there must be no "babying" of any kind; prompt obedience to parental authority must be exacted, and pains taken to develop self-control and a due sense of responsibility in the relations of child-life. Such a course will be the more effective if the child is not allowed to suspect that it is the object of special solicitude or anxiety. Unfortunately, parents of such children do not always possess the ability or good sense to carry out such a plan.

The treatment of hysteria itself is very largely of a moral character, and success depends chiefly upon the clear-sightedness and tact of the medical man. He must observe and duly weigh everything concerning the patient and her surroundings. He must alike avoid unnecessary brusqueness of manner and an appearance of deep sympathy; if too brusque, he may give just cause of offense; if too kindly and sympathetic, he may find it difficult to keep the patient at a proper distance from himself. He must not scold and censure that which is in reality the result of sickness, neither can he admit that the patient, by the exercise of will, may not control at least incipient attacks of hysteria. He must develop in the patient unselfishness and self-control, yet he is rarely in a position to make her surroundings such as will aid his efforts in this direction. Above all things, he must succeed in teaching the patient that she is to obey implicitly and to the letter.

In a general way the treatment is largely that of neurasthenia. The patient must be relieved of any organic or other affection which aggravates her condition. Electricity, cold sponge-baths, cold douches, massage and sea-bathing are helpful when judiciously employed. If at all possible, the patient should be removed from home, beyond the reach of anxious and injudicious friends, to some quiet mountain resort or to the sea-side, and there kept under the watchful care of an experienced, tactful nurse who is able and willing to be attendant, guardian and companion. Places of any sort where invalids congregate are to be religiously avoided, since the discussion of their various affections will beyond doubt arouse in the hysterical patient a determination to outshine them all,

thus at once defeating all hope of receiving benefit from a change of surroundings. In severe cases the perfect isolation from all friends and acquaintances, including even letters from them, the absolute rest, systematic and abundant feeding, with daily massage and electricity, which constitute the Weir Mitchell treatment, promise relief which may not be obtained in any other manner, especially in cases of thin and badly nourished persons.

When in *convulsions*, it is well to let the patient alone. Exertions on part of the attendants, especially the physician, are what the patient demands, and to insure them she will do everything in her power to increase the severity of the attack and the incidental display of suffering. If unsuccessful, the patient will be disgusted and not think it worth her while to exert herself. At times it is well to use a cold douche or cold shower-bath, so as to arouse her will and gain control over the muscles; sometimes violent vomiting, produced by lobelia or any other emetic, preferably the hypodermic injection of apomorphia (gr. $\frac{1}{20}$ to $\frac{1}{10}$), will cut short the spasm and prevent its recurrence, not by any specific action upon the hysterical condition, but simply by arousing the will power of the subject. Medical literature abounds in cases of hysteria which for many years had resisted all attempts at a cure, and yet made an instantaneous and permanent recovery from the sudden occurrence of an accidental or manufactured emergency; here belong cases of long-standing paralysis suddenly cured by an alarm of fire in the house.

Hysterical Paralysis.—The subject must be made to regain the use of the palsied limb by exercise. This may be accomplished by first placing her on her feet, then making her walk slowly, firmly supported on each side, increasing the exercise as she is able to bear. Perseverance usually brings about a cure by this means alone. Massage and the electric current are also useful. Paralysis of the vocal cords demands the same treatment, electricity being applied within the larynx or externally.

Contractures require energetic passive motion, secured by massage and faradism, and regular exercise in voluntary movements. Hypnotism has been successfully used.

Anæsthesia calls for the use of the faradic wire-brush. Pseudo-hysterical *angina pectoris* is not often severe enough to require

special treatment; nitro-glycerine, amyl nitrite, digitalis, spigelia and similar remedies may be exhibited to advantage. Painful spots in the back ("irritated spine") are frequently relieved by a belladonna plaster. *Severe hysterical vomiting* may necessitate artificial feeding; if so, the nasal-œsophageal tube is preferred. In hysterical affections of the *eyes* or *ears* it is advised not to humor the patient by allowing the use of smoked glasses or living in darkened rooms, or by the exclusion of common sounds.—If catheterization is necessary, the operation, upon a woman, should be performed by a woman nurse.

Treatment by "suggestion" has found many advocates. Its success depends upon the proper relation of the patient to the physician, i. e., one of perfect confidence and readiness to co-öperate. It is suggested that mock surgical operations, the use of offensive drugs, and similar measures, frequently prove useful because they create a strong impression upon the mind of the subject.

Therapeutics.—It is still an open question whether, or not, permanent relief in this condition may be afforded by the use of internally administered remedies; that they are often helpful, especially in times of great emotional excitement, cannot be denied by any who have given them an intelligent trial.—**IGNATIA** is by all means the most frequently indicated and most reliable remedy. Its mental symptoms are particularly important. It acts best when there is intense emotional excitement, globus hystericus, and "sinking" sensation at the epigastrium, with characteristic headaches (clavus). The patient is full of grief, weeps, sighs, sits by herself, nursing her sorrows. It has copious flow of urine during and after hysterical seizures.—**ASA FŒTIDA** is an important remedy. The presence of gastric flatulency, causing palpitation or excited action of the heart, with flushing of the face, is a reliable indication. Hale is correct in stating that it is especially useful in large, fleshy, emotional, excitable and passionate women, and that it must be continued for a long time to do its best work. It should be used in the low attenuations.—**MOSCHUS**. The symptoms are striking. The patient faints upon every occasion, from the slightest cause, and faints often, especially in a warm room. Spasmodic constriction of the larynx and chest, so severe that suffocation seems imminent. Globus hystericus. Great dyspnœa, asso-

ciated with pain about the heart, like angina, and violent palpitation of the heart. Tremulous nervousness. Copious, pale urine.—**AURUM**. Great, even uncontrollable, sexual excitement, bordering upon mania, often with heat, swelling and great itching of the pudenda and sensitiveness of the vagina, accompanied with cardiac irritability and palpitation. Her nights are rendered unbearable by intensely lascivious dreams. She becomes unstrung, hysterical, threatens to kill herself, but is too afraid of dying to make serious attempts at suicide. Heat on the top of the head.—**AURUM MURIATICUM NATRONATUM**. “Hysterical spasms, with unconsciousness for several hours, beginning with coldness starting from abdomen, sometimes with pulsation in occiput, with inflamed uterus filling the entire pelvis, interfering with the action of the bowels and bladder, entirely cured.” T. F. Allen.—**COCCULUS**, especially at the menstrual period, with numbness and weakness of the extremities. Nausea and vomiting exceedingly troublesome from their persistence; extreme aversion to food; hysterical dyspnoea.—**NUX MOSCHATA**. Hysteria with frequent fainting from slight causes, with enormous bloating of the bowels, vaginal flatulency, fluttering of the heart with faintness. Tendency to a comatose state. Dryness and coldness of the skin.—**PULSATILLA**. In women who weep whenever anything ails them. Characteristic catarrhal, gastric and menstrual derangements. Neuralgia, with chilliness.—**PLATINA**. Hysterical alternations of laughing and weeping; constriction of the œsophagus; globus hystericus; alternations of anæsthesia and hyperæsthesia. Melancholia, with notions of grandeur; religious melancholia with palpitation of the heart and great dread of death. Hysterical gastralgia. Sexual melancholia. Satyriasis. Nymphomania with extreme sensitiveness of the external genitalia, sometimes with numbness. Characteristic uterine disorders. Extreme nervous excitability; sleeplessness.—**TARENTULA**. Violent alternations of moods, especially with sudden, stealthy and destructive impulses. Hystero-epilepsy, with wild shrieks. Hysteria, with constant movement of the extremities, especially of the hands.—T. F. Allen doubts the reliability of this remedy in hysteria. I have no experience with it. Among other reported cures the late W. H. Holcombe relates the following case: The attacks commenced by spells of yawning and

irregular breathing; these were followed by muscular contractions of every sort; first fixed look, lasting for several minutes, followed by wild shrieks, and this followed by continued coma; the whole scene varied from time to time by hysterical paroxysms of laughing and crying. I have never witnessed more astounding and complicated hysterical phenomena in my life. Epilepsy, catalepsy, chorea, tetanus, hydrophobia, apoplexy, ecstasy, somnambulism, spinal irritation and ordinary hysteria, all seemed to have a hand in producing the constantly shifting panorama of symptoms. The patient, who at the end of a month's treatment was worse instead of better, was cured in two days by TARENTULA.—VALERIANA. Globus hystericus; feeling as though something warm were rising from the stomach into the throat. Great fear of being left alone, especially in the dark.

When convulsions are violent, consult BELLADONNA, CICUTA, HYOSCYAMUS, STRAMONIUM. The expressed juice of *Passiflora incarnata*, in physiological doses, is said to have a very soothing effect when there is great restlessness and sleeplessness. See also remedies under *Neurasthenia*.

VERTIGO.

A sensation or appearance of movement, involving a real or seeming defect in the equilibrium of the body, with more or less disturbance of consciousness and, often, distinct perversion of the special senses. If *subjective*, the subject appears to himself to move; if *objective*, external objects seem to move. The vertiginous state consists of attacks of vertigo which follow each other rapidly.

Organic or *arterio-sclerotic* vertigo occurs in connection with cerebral disease characterized by impairment of nutrition from arterio-sclerosis of the vessels of the brain. *Cardiac* vertigo depends upon fatty, or other, degeneration of the heart, with failing power, excited by physical exertion or mental excitement; it is also a feature of the distress caused in some persons by the greatly rarified atmosphere of a high elevation. *Epileptic* vertigo is a symptom of idiopathic epilepsy. *Neurasthenic*, *hysterical* or *neurotic* vertigo arises from exhaustion or irritation of the nerve centres, as seen in neurotic conditions; it often is excited from sudden, severe peripheral sense-irritation, as a

sudden and brilliant flash of light. *Ocular* or *ophthalmic* vertigo is usually a result of severe disorder in the ocular motory apparatus. It is often accompanied with a sensation of falling backward, and there may be severe pain in the back of the neck. Irritation of the special sense from waltzing, swinging or rapid whirling about, the passing of rapidly moving objects (cars), possibly sea-sickness, causes a form of ophthalmic vertigo with nausea, vomiting, great prostration and heart-failure. *Aural* vertigo is a conspicuous feature of Menière's disease (sudden congestion of, or apoplexy into, the semi-lunar canals) and of Voltolini's disease (purulent labyrinthic otitis); also of affections of, and mechanical interference with, the Eustachian tubes. The terms "gastric," "bilious," "intestinal" vertigo are self-explanatory. *Laryngeal* vertigo follows a sharp, spasmodic cough, with laryngeal hypersensitiveness. *Toxæmic* vertigo arises from alcoholic, uræmic, lithæmic, and other, poisoning; bilious vertigo may belong here. The *essential* vertigo of Gowers is caused by some unknown morbid state.

The treatment of vertigo is addressed to its primary cause. Thus, in vertigo arising from gastric, intestinal or bilious disturbances, NUX VOM., BISMUTH, ASA FŒTIDA, BRYONIA, CALCAREA CARBON., CHELIDONIUM, CHINA, COLCHICUM, COLLINSONIA, ÆSCULUS, HYDRASTIS, MERCURIUS, PODOPHYLLUM, PULSATILLA, SABADILLA, SULPHUR, and others, must be carefully studied.—Aural vertigo usually demands GELSEMIUM, CAUSTICUM, SALICYLATE OF SODA, AURUM.—Organic or cerebral vertigo suggests CAUSTICUM, ZINCUM, ARGENTUM NITRIC., ANACARDIUM, PLUMBUM, CUPRUM, OPIUM, TABACUM, and others; if characterized by congestion, BELLADONNA, GLONOIN, STRAMONIUM, HYOSCYAMUS, KALI BROMATUM. If due to anæmia: FERRUM, CHINA, PHOSPHORUS, etc.—In neurasthenia and other neurotic states: GELSEMIUM, LACHESIS, COCA, CIMICIFUGA, COCCULUS, IGNATIA, KALI BROMATUM, MOSCHUS, NUX MOSCHATA, PLATINA, COFFEA, AMBERGRIS, THERIDION.—In feeble persons of advanced years, CONIUM, AURUM and ALUMINA are to be consulted. In short, routine prescribing is a waste of time; nothing will answer the purpose save an exhaustive examination of the materia medica and of the ætiology of each case.

EPILEPSY.

A nervous affection of unknown pathology, characterized by attacks of unconsciousness, occurring at long or short intervals, with or without convulsions. If accompanied with general convulsions, they are described as *Grand mal*, while the term *Petit mal* is applied to the more transient paroxysms in which no convulsions are seen. At times the spasms are localized, and there may, or may not, be loss of consciousness; this form is described under the term *Jacksonian* or *Cortical Epilepsy*.

Ætiology.—Heredity is beyond doubt a most important factor, if by this we understand an inherited neurotic tendency, expressing itself in the parents by a general predisposition to affections of the nervous system, as insanity, hysteria, etc. Direct inheritance, or the transmission of epilepsy from an epileptic parent to the child, is comparatively infrequent. Whatever in a parent weakens vitality and the tone of the nervous system may in the child cause a predisposition to epilepsy, as to other nervous affections; hence, alcoholism, sexual, and other, excesses in a parent are in a limited sense to be considered here. Steady hard drinkers are often epileptics, and syphilitic brain lesions may result in epilepsy. Among the exciting causes, violent emotions, especially fright, have been considered common factors; it must, however, be admitted that their importance has probably been overestimated; they would not lead to such serious results were not the tendency to epilepsy so strong that it requires only a trifling cause to bring on the explosion. The same applies to infectious fevers. Epilepsy has also occurred during the passage of gall-stones, during the removal of pleuritic fluid, from imprudence in eating and other causes which appear trifling. It was thought for a time that cases had been traced to eye-strain, and that correction of the evil had resulted in cure, but this opinion is no longer entertained. "Traumatic" epilepsy results from a fall, blow, cut or similar injury to the head. Since here an anatomical basis always exists (cortex), even though usually not extensive, such cases do not constitute true epilepsy. Again, the affection may be reflex in character, as in the case of a splinter which is retained and exerts pressure upon a peripheral nerve

trunk, or a cicatrix pinching a nerve, or the irritation arising from dentition, from some foreign body in the ear or nose, or from a tightly adhering prepuce. Removal of the offending body may be followed by a cure. Such cases, however, are more rare than is generally supposed.—Epilepsy occurs in both sexes; the many tables published show no decided preference for either sex. It usually sets in during the first two decades of life. Of 1450 cases collected by Gowers, 422 cases occurred before the tenth year, and three-fourths of the entire series before the twentieth year; it rarely begins after the thirtieth year.

An interesting feature of this affection is the establishment of the "epileptic habit" in cases of reflex origin; the cause may be removed, but the seizures continue.

Symptoms.—*Grand Mal.*—In nearly every instance a major seizure is preceded by a warning (*aura*) consisting of some abnormal, odd sensation in some part of the body; of these a very large variety has been recorded, but whatever its character may be, it is nearly always the same in the same person. The aura may precede from one finger, or one hand, or a foot, extending from the periphery to the centre, toward the head; when it reaches the head, the patient falls. In other cases there may be gastric distress which the patient cannot describe, commonly with a feeling as though something were rising from the stomach, or it may be a sensation of tightness or of choking in the throat, or a heart-burn, or a colicky pain in the abdomen. Frequently the aura refers to the special senses, oftenest the eyes; thus there are seen flashes of light, or a display of colors, red appearing first; or objects about the room may suddenly change in size, or there may be loss of vision; if referring to the ears, sounds are heard, voices, music, possibly the sound of hissing steam; rarely unpleasant odors or tastes constitute the warning. Sometimes there is a feeling of a breath of air or a draft striking him. Again the aura may be psychical, as a state of sudden excitement, apprehension, fear or mental abstraction; or, quite rarely, it is intellectual, consisting of some thought or idea which always recurs just before an epileptic spasm. Or some motor phenomena may regularly take place at this time; the patient may, for instance, all at once start on a run, or he may suddenly begin whirling round and round with astonishing swiftness.

Exceptionally an aura may be distinctly felt, yet no spasm follow; sometimes sufficient time elapses between the aura and the convulsion to have the patient guard against possible injury from falling or even to warrant an attempt to avert the seizure.

The onset of the seizure often is marked by a loud cry (epileptic cry), which results from forcing air through the narrowed glottis; in hysteria a similar noise may be made, but, unlike the cry of epilepsy, it usually is repeated. When the cry is made, the patient falls unconscious, as though shot, without attempting to protect himself against injury, and often receiving a serious hurt, of which at the time he is insensible.

A violent tonic spasm constitutes the first stage of the seizure proper. The patient lies in a state of perfect rigidity, with extended legs, the head drawn back or toward one side, preferably the right, the head and neck twisted to one side, and the jaws fixed. The arms usually are flexed at the elbows, the hands at the wrists, and the fingers either tightly closed upon the thumb in the palm of the hand or fixed in a position as though grasping a pen, with the thumb resting against the first finger. The knees and hip-joints may be flexed or the legs and feet rigidly extended. The thoracic and abdominal muscles are fixed; hence there is impeded or arrested respiration, with cyanosis; the face, which at the beginning was pallid, quickly assumes a dusky, livid hue; the facial muscles are convulsed, especially on the side towards which the head is drawn. The duration of the tonic spasm lasts from a few seconds to a minute, or more.

The *clonic* stage begins with lessening of the tonic rigidity, followed by tremors and vibratory muscular movements which rapidly grow stronger and, developing distinct intermissions, culminate in violent general clonic spasms. The movements are severe, shock-like; the arms and legs are thrown about heedless of possible injury; the head is pounded upon the floor; the muscles of the face are powerfully agitated; the eyes roll spasmodically, and the lids are opened and closed convulsively; the jaws close with great force and, in case the tongue protrudes, inflict upon it severe injury; frequently the tongue is thrust forward and back, and may thus be caught between the teeth. Frothy, often bloody, saliva escapes from the mouth,

and there may be involuntary discharge of fæces, urine or, in men, seminal fluid.

Respiration is slow, irregular, noisy, and in some cases seems almost arrested. The pupil of the eye during the height of the paroxysm is immovable and dilated, and frequently at this time insensible to touch; return of the pupil to a normal condition may be considered a sign that the spasm is yielding. The pulse at first is feeble, later it becomes rapid and full. The bodily temperature is nearly always elevated. The convulsions usually are stronger on one side of the body than on the other. This stage lasts from one to two, or more, minutes.

The last stage, that of coma, is initiated by a gradual cessation of the spasms and general muscular relaxation. Respiration is reëstablished; it is at first noisy and stertorous. The face loses its lividity, but is flushed for some time. The patient remains in a state of profound unconsciousness, gradually assuming the character of a heavy sleep which may continue for hours. In other cases the patient is easily roused, and not infrequently, even though the spasm may have been quite severe, he awakens of his own accord after a few minutes of rest. There is almost always some degree of mental confusion, heavy and stupid headache, and some muscular soreness.

After an attack, and for some little time, the knee-jerk usually is absent; sometimes it is exaggerated; ankle clonus is present in the greater number of cases. The urine is increased and not infrequently contains albumin. There may also be paresis of one side or of one limb, but it is transient and of short duration.

Should the spasms be repeated, following each other in rapid succession, the patient failing to regain consciousness, the condition (*status epilepticus*) is one of great danger. In such cases there is a decided rise of temperature (105° to 107°), and death may occur from exhaustion.

Petit Mal consists of sudden periods of unconsciousness, nearly always coming on without a distinct aura; they may be associated with faintness and dizziness. The patient suddenly stops in whatever occupation he may be engaged, remains motionless for a few moments, with pallid face and fixed eyes, dropping anything he happens to hold in the hand; in a moment or two, usually with a somewhat dazed look, he proceeds with his occupation, possibly eating or playing cards or chatting, as

though nothing had happened. Such an attack may occur on the street, the patient continuing to walk and, upon recovering consciousness, finding himself lost. In this state he may enter upon long journeys or commit other acts which are inexplicable. In many cases the patient appears vaguely conscious that "something is wrong;" frequently incoherency is shown by the automatic performance of some act which is wholly out of place; thus it is not unusual for women to begin undressing. Exceptionally some grave impropriety or wrong may be thus committed, causing serious distress to the patient and his friends.

It is the common experience that these minor seizures gradually grow worse, eventually terminating in grand mal, when the two forms alternate.

Various and manifold deviations occur from the types described; cases seen in practice present a range from the slightest, scarcely perceptible, seizure to attacks of terrible intensity.

Often attacks occur only in the night, and in that case they may for a long time exist unsuspected, the patient after the seizure passing into a quiet, refreshing sleep. The conditions which should arouse suspicion are unaccountable weariness and muscular soreness in the morning, laceration of the tongue, and possibly wetting of the bed during sleep, which cannot be otherwise accounted for.

Again, there is a rather rare class of cases in which there are strongly pronounced circulatory disturbances, and it is difficult to decide whether these or the nervous symptoms are the primary affection. This has been called *cardiac epilepsy*, of which two forms are distinguished, the *syncopal* and the *congestive*. The syncopal form is characterized by an exceedingly low pulse, perhaps ten beats per minute, and subnormal temperature. The attack may be ushered in by an aura, sometimes a feeling of intense coldness. The convulsions are not violent. The congestive form presents symptoms of extremely excited circulatory disturbance, with violent congestion to head, face, and conjunctiva, and with free epistaxis. Convulsions here are violent. In some cases no convulsions occur, but the patient suddenly begins to walk forward and backward, or to run rapidly in a circle, or to spin round and round with astonishing rapidity, or possibly rush out of the house, covering a long

distance, evidently acting upon an impulse which he cannot control. This is *epilepsia precursiva*, a form which is almost limited to childhood, eventually assuming the usual classical form. It is closely associated with moral insanity.

Samt has described certain psychical disturbances which take the place of convulsive seizures and which he classes under the name of "epileptic equivalents;" these have been extensively studied by others, and embrace sensory, sensorial, and psychical symptoms appearing in paroxysms and followed by exhaustion. To these belong attacks of angina pectoris, asthma, spasms of the glottis, neuralgia of the viscera, migraine, and mental disturbances characterized by vacuity and violent, irresistible impulses in the direction of some outrageous, indecent act or the commission of some crime.

While epilepsy has existed in some persons of distinguished ability, even these have shown the disturbing influence of this affection upon the emotional life, engendering an emotional irritability which renders the subject liable to be easily moved to hilarity or anger and violence. If this tendency is strongly pronounced, it may terminate in *epileptic mania*, characterized by intense excitement, delirium, and hallucinations and delusions which conform to the type of the emotional storm. The condition may be one of absolute frenzy in which the subject has no control of himself, is violent in the extreme, and may commit homicide or suicide. Such seizures may last a short time or for days. Upon recovery the patient has no recollection of anything that has taken place and is always extremely exhausted. If the attack was unusually short and light, he may vaguely remember what occurred. Such cases are of importance from a medico-legal aspect. If there has been committed a crime of more than usual atrociousness, without motive, useless and brutal in every sense, and the criminal appears to have no recollection of it, the previous history of the accused should be carefully examined in reference to possible proof of epilepsy. Attacks of mania may recur at irregular intervals after periods of perfect mental soundness; these recurrences are in every sense repetitions of previous attacks.

Progressive mental enfeeblement and even dementia may occur; in cases which do not reach this stage, mental dullness and failure of memory are common. Imbecility and idiocy are connected with organic changes in the brain.

The frequency of the paroxysm varies very much. They may occur at intervals of many years, or several may take place in the twenty-four hours; in the average case there are recurrences every two to four weeks. Certain external influences materially affect the frequency of the attack. Alcoholic excesses, great sexual excitement, violent mental emotions or effort, "over-doing," and imprudence in diet will almost always increase the frequency of the attacks, while an abstemious and orderly way of living has a beneficial effect. Hirt states that the occurrence of copious bleeding from the nose increases the interval between paroxysms, and that, in case there is a motor aura, the application of a tight strap or bandage to the finger or hand from which it precedes may avert a seizure. During pregnancy epileptic women sometimes are comparatively free from seizures; sometimes the reverse occurs. Intercurrent diseases, as certain fevers or facial neuralgia, seem to protect for the time being against a paroxysm. During the intervals between the seizures the general health may be good; as already stated, there may be some deviation from the normal in the patient's mental condition, and there is always in well marked cases danger of mental failure; usually, moodiness, mental dullness or irritability, slowness of comprehension, with failure of memory, are easily distinguished; but care must be taken to distinguish between peculiarities of temperament or person and the effects of the disease.

Jacksonian epilepsy (partial or cortical epilepsy) consists of convulsions which are limited to one-half of the body or to a single limb, to the face or to a group of muscles; there is not usually loss of consciousness. Its ætiology embraces irritation in the motor zone from any cause; meningeal inflammation, syphilitic neoplasms, pressure upon the cerebral cortex from fracture of the skull, cerebral lesions of vascular origin, uræmia, progressive paralysis of the insane, and peripheral irritation acting upon the nerves of the extremities, trunk or viscera, especially the pleura.

The spasm is rarely preceded by an aura, which, if it occurs, usually consists of a sense of numbness, possibly pain, in the part to be affected. Consciousness is nearly always retained if the epilepsy is truly partial. The convulsions usually start in the face or extremities. If in the face, they may center in the

eyes or mouth, but practically involve the entire face, extending to the neck, possibly to the arms and legs. If in the arm, the thumb and index finger, later all the fingers, are convulsively flexed into the palm of the hand; the muscles of the forearm are then involved, then those of the arm and shoulder; should the spasm extend beyond this, it next seizes the muscles of the neck and face, then the leg. If the seizure starts in the leg, it begins with the big toe, extending upward, causing movements of extension in the upper, and movements of flexion in the lower, leg.

The spasms vary much in severity; as in general epilepsy, the condition of the affected muscles is first tonic, then clonic; the seizure is followed by a brief period of stertor and exhaustion. In light seizures, as in the arm, the patient is not only conscious, but may continue to talk and complete any task at which he may happen to be engaged; if the spasms become general, consciousness is lost during the latter part of the seizure. Sometimes there is invasion of the corresponding muscle on the side opposite to that first attacked. Muscular exhaustion, amounting to transient or even permanent paralysis, may follow.

The attacks recur at long intervals, of several weeks or months, but exceptionally much oftener, even daily; in the same person they maintain the same form and order of development. Rarely they assume a status epilepticus, in which case they may prove fatal.

Diagnosis.—Usually it is not difficult to recognize the major form of epilepsy; in many respects, however, it resembles hysteria. The table on the following page, from Gowers's work, clearly shows the most important points of differentiation:

The difference in the manner in which the hysterical patient falls and the relief occasionally experienced from ovarian compression are also points to be remembered. *Uræmic convulsions* are characterized by greatly increased tension and may be recognized from examination of the urine. The age of the patient must be taken into consideration. For certain illegitimate purposes persons may simulate epilepsy; this is often done in Europe to escape military duty. If the malingerer is determined and skillful, it may tax a careful diagnostician to expose the deception. Wood points out that the violent muscular efforts made can dilate the pupils, but that they will contract to the stimulus of light, and that snuff blown into the nostrils will cause sneezing in the sham-epileptic.

Prognosis.—Epilepsy is essentially a life-long disease; though the patient has been free from attacks for years, they may recur through some special excitement or imprudence, and even without apparent cause. It is largely on this account that treatment should be maintained indefinitely, and the patient be kept

| | EPILEPTIC . | HYSTEROID. |
|----------------------|---|---|
| Apparent cause. | None. | Emotion. |
| Warning. | Any, but especially unilateral or epigastric auræ. | Palpitation, malaise, choking, bilateral foot aura. |
| Onset. | Always sudden. | Often gradual. |
| Scream. | At onset. | During course. |
| Convulsion. | Rigidity, followed by "jerking," rarely rigidity alone. | Rigidity or "struggling," throwing about of limbs or head, arching of back. |
| Biting. | Tongue. | Lips, hands, or other people and things. |
| Micturition. | Frequent. | Never. |
| Defecation. | Occasional. | Never. |
| Talking. | Never. | Frequent. |
| Duration. | A few minutes. | More than ten minutes; often much longer. |
| Restraint necessary. | To prevent accident. | To control violence. |
| Termination. | Spontaneous. | Spontaneous or induced (water, etc.). |

under close observation for years after the seizures have ceased. Death during a paroxysm occurs only as the result of an accident, such as injury from the fall, or smothering under the bed-covering or in the pillow, or by getting food into the windpipe if at the table when a paroxysm occurs. Epilepsy, however, shortens the life-expectancy, the subject usually dying from some intercurrent disease. The affection is always to be considered serious and a cure uncertain. In young children recovery is not unusual, and may be spontaneous and permanent; but even adults, particularly men, may be cured. Favorable to a cure are: early intelligent treatment as soon as the nature

of the disease is ascertained; infrequency and mildness of the attacks; improvement, under treatment, of the general health, of the mental condition, and of the memory. Unfavorable are: occurrence of grand mal and petit mal in the same case; a history of epilepsy covering many years; intensity of the individual attacks and prolonged stertor; marked mental failure. Judging from my own experience in adults, a general improvement in health and in the mental sphere, even though slow, following the treatment, and not accompanied with material lengthening of the intervals, yet constitutes an encouraging sign.

In Jacksonian epilepsy the prognosis is much better, save when epilepsy results from the presence of a cerebral tumor, with symptoms of compression, in which case it is bad. Epilepsy due to a peripheral lesion may or may not be cured by its removal; the convulsive habit once established, the removal of the primary cause may not effect the course of the disease.

Treatment.—The nature of epilepsy, the frequency with which it occurs, and the comparative hopelessness which settles like a pall upon the epileptic patient and his family, all appeal strongly to the medical profession for an effective method of treatment. It is humiliating to admit that after centuries of honest and unflagging endeavor only slight progress has been made in this direction. The following is a summary of what is now considered the most promising management of a case.

The general treatment consists of careful attention to the habits of the patient, including diet and regular sponging in cold water, followed by brisk rubbing of the skin. Pains must be taken to provide agreeable occupation, and, whenever possible, some regular employment which is free from danger to the patient in case he is suddenly taken with a seizure. Overexertion of any kind, whether physical or mental, and excitement, including active society life, are to be scrupulously avoided. If circumstances admit, an attendant should be provided, but it is well to avoid the appearance of constant watching; if such an attendant can not be had, care must be taken to have some member of the family keep a sharp watch upon the epileptic, lest he may seriously hurt himself by falling into the fire, against a hot stove, out of a window, or from a height. The same care must be exercised at night, in bed, since a patient may be smothered under the bed covering or by pressing the face firmly

into the pillow. Under no circumstances should the patient be allowed to go alone into a bath; swimming, bicycling and horse-back riding are, of course, out of question. Dancing or swinging cannot be allowed, since these exert a disturbing effect upon the cerebral circulation. The diet should be plain, but nourishing. Experience proves that vegetables, ripe fruit and milk are to be preferred to a meat diet; the latter often does positive harm. Meat once a day is not objectionable. Sexual excitement is harmful. Alcoholic stimulants of any sort, tea and coffee must be used with great moderation, if at all; the same applies to tobacco. The long-continued use of cod-liver oil has proved beneficial to thin, anæmic subjects. The value of internal medication depends very largely upon the faithfulness with which these general rules are observed and the perseverance exercised by the family in following treatment. Since the introduction of the bromides in the treatment of epilepsy (1853), these have, in the medication of the profession at large, gradually supplanted all other drugs. If their employment has fallen far short from accomplishing what was expected of them, it has certainly been demonstrated that in some cases they suppress the spasm and occasionally for a long time prevent its recurrence. Authorities differ concerning the manner in which the bromides should be given in order to obtain the best results. It is, however, freely admitted that they should be administered in large doses, repeated not oftener than three times a day (after each meal), and many experienced practitioners hold that it is even better to give only one large dose just before retiring. Unpleasant effects, chiefly upon the mind, follow their exhibition in small doses and at short intervals. Of late, sodium bromide is preferred to the potassium bromide because it is more readily borne by the patient. Others prefer a solution containing the bromides of potassium, ammonium, and sodium. Hirt, who has had large experience, states that the moderate doses formerly used, from eight grains to one drachm, are generally ineffectual, and he advises one daily minimum dose, for adults, of two drachms, also indorsing Mendel, who gives it in valerian-tea immediately before going to bed, in the following proportion: of pot. bromide and ammon. bromide, thirty-eight grains each, of sod. bromide, fourteen grains. If two-drachm doses are not sufficient, Hirt

increases it gradually to three drachms, and continues it until from six to nine ounces have been taken. Other authorities continue the salt in daily doses of one drachm to a drachm and a-half for years, even for two years or more after the seizures have ceased. One of the first indications that the system has come under the influence of the drug is loss of the palate reflex, and it is necessary to reach this point. Many persons cannot take the drug at all, and absolutely refuse it after having taken a few doses; in others it causes great muscular and mental lassitude, constant sleepiness, loss of memory and melancholy, necessitating a lessening of the dose. Acne on the face, extremities and trunk is a common drug-effect; it can be prevented by giving the bromide in alkaline waters and occasionally administering a full dose of arsenic (Seguin). The sudden withdrawal of bromides, according to Féré, is exceedingly risky and may result in the recurrence of the paroxysms, assuming even the form of the dangerous status epilepticus. The bromide of strontium has given satisfactory results and causes no gastric irritation. Bromide of camphor has proved useless. During a course of bromides the occasional exhibition of belladonna is highly recommended. (Extr. bell., grs. viiss; Pot. brom., Sodii brom., Ammon. brom., ãã ÿss ; Pulv. et. succ. liq., ãã q. s. ut. f. pil. No. 50. Signa: One to two pills in the evening.) Hammond advises bromide of zinc, in a solution of one drachm in one ounce of simple syrup, from 10 to 30 drops three times a day.

Electricity has been employed by passing the galvanic current from one mastoid to the other or obliquely from one frontal region to a point diametrically opposite at the nucha; for this method also no satisfactory results can be claimed.

Epilepsy arising from reflex action may demand surgical interference. Thus a cure may result from the removal of a splinter of bone causing cortical irritation, from the excision of a cicatrix, the relief of an adherent prepuce, or from circumcision, or from the stretching of a tight sphincter ani. Such cures, however, are very rare, and it is a serious question if the interest created by them has not in the long run been calamitous rather than beneficial to the sick, in so far as many operations have been performed which were not indicated or excusable.

The treatment of the spasm itself is simple. If sufficient time elapses between the aura and the spasm, an attempt may be

made to abort the latter by firmly bandaging the extremity from which the aura precedes or by vigorously rubbing the part from which it emanates. If the aura is epigastric, a big pinch of salt taken at once may abort the fit. Sometimes the inhalation of amyl nitrite answers the same purpose. But opportunity for the employment of such measures is afforded only in exceptional cases, and their actual value is not great. Indications of a convulsion presenting themselves, the patient should be gently laid on the floor, the clothing loosened, especially about the throat, fresh air admitted into the room, and some firm substance (rubber ring) be placed between the teeth to protect the tongue. If the convulsions are prolonged, a few whiffs of chloroform or amyl nitrite may help cut the attack short.

So far as strictly homœopathic treatment of epilepsy is concerned, an immense amount of clinical testimony has accumulated to prove the certainty and rapidity with which the disease can be cured by "the indicated remedy." Unfortunately, here as with the wonderful cures published by enthusiasts in other schools, an unbiased examination shows that usually the cases reported cured were not epilepsy at all or that the report was made long before an experienced practitioner would dare admit, even to himself, that a cure had been accomplished. Nevertheless, I am thoroughly satisfied that infinitely better results are obtained under the "homœopathic" treatment of epilepsy than can be claimed for the treatment with bromides, provided the physician in charge possesses sound judgment, close observation and patience, and is dealing with a case which renders it possible to strictly carry out the general directions already considered.

It is very important to have the physician rid himself of the impression that the spasm itself will furnish him with "indications" upon which to base the selection of the remedy, or that at some time or other there will present itself with unmistakable plainness some "grand characteristic" which will enable him to pounce upon the remedy of which one dose will cure a case of many years' standing. It is true that in very many cases there is some one remedy which appears to underlie all permanently curative attempts. That remedy is usually found in the "constitutional bias" of the patient, in temperamental

peculiarities which may to the careless observer appear trifling, in his preferences or dislikes, and will often betray itself in the small doings of daily life which the physician must *observe*, but which no list of carefully framed questions can elicit. This fact explains why CALCAREA CARBONICA, SILICA, and other profoundly acting remedies which in provers have never produced a condition like true epilepsy are often of inestimable value when the so-called antispasmodics are perfectly useless. Further than this, the utmost watchfulness must be exercised in promptly meeting such derangements of health which in a normal condition may be of no moment, but in an epileptic prove the reverse. A tendency to headache, which may appear so trifling that it is not considered worth mentioning to the physician, or a slight uneasiness at the heart, or light palpitation with, possibly, gastric flatulency of very moderate degree, or occasional states of biliousness scarcely enough to attract passing attention, must be met promptly and may suggest some remedy which otherwise would not be considered, but which here may greatly facilitate a cure. Thus GELSEMIUM did permanent good in a case which has been under my observation for over ten years, and in which there is promise of a cure; the remedy was suggested by slight but frequent headache with a tendency to drooping of the eyelids, flushed face, dizziness, and general muscular weakness. In a similar manner ASA FÆTIDA, MOSCHUS, PULSATILLA, and others may be indicated by mild gastric or nervous symptoms, and prove very helpful. It is often the case that an epileptic patient will not of his own accord mention minor ailments like this; their very recognition depends upon the watchfulness of the physician. It might be asserted that the attention which is paid to "small things" holds the promise of a cure.

Another point is the necessity of not only having the patient under constant treatment for years, but *so long as there is actual improvement*. The patient and his friends will naturally measure the latter only by the relative frequency and severity of the convulsive paroxysms; and yet, this standard may be wrong. I would lay down the axiom that a patient is making unqualified gain if under treatment there is an improvement in the mental and moral sphere, especially if there is less moodiness and irritability than formerly, and if the perceptive facul-

ties and the memory are more vigorous; this is true even though there be no material lengthening of intervals or lessening in the severity of the spasms.

Several writers suggest the wisdom of having a record kept by some friend, in which are entered the date of the spasms had and the conditions connected with it. The suggestion is practical and valuable, as I can testify from my own experience.

CALCAREA CARBONICA, CALCAREA PHOSPHORICA, SILICA and SULPHUR are to be given as "constitutional" remedies when the general condition of the patient warrants their exhibition. It is not necessary here to point out the symptoms covered by each.—ARGENTUM NITRICUM when the attacks are the result of fright or occur about the menstrual period; in persons who have been guilty of alcoholic and venereal excesses. Tremulous anxiety and restlessness before and after a spasm. Great melancholy; dreads being left alone. The characteristic gastric symptoms, especially flatulency with palpitation, are very important.—BELLADONNA. Violence of convulsions; characteristic congestion to head and face; in persons of light, florid complexion. Bojanus and the older homœopaths report many cures with BELLADONNA. It undoubtedly is of great value in recent cases; its relation to states of violent cerebral congestion, often with characteristic delirium and mania, render it helpful in acute attacks characterized by these, but it is of slight benefit in old and well-established cases.—BUFO (RANA BUFO) appears to have permanently cured a number of cases. It is said to be indicated when seizures occur at the menstrual period or are precipitated by sexual excitement. The aura starts from the sexual organs or solar plexus. The patient is easily angered, feels cold a good part of the time. Saville, Holcombe and many others thought it an excellent remedy; my experience with it has not been conclusive.—CUPRUM METALLICUM has given positive results, in my experience, in three cases, all of long standing and in women, when menstruation invariably brought on a spasm or was within a week followed by a violent paroxysm. In all the cases coldness was marked; in two of them the spasm was followed by violent headache, with coldness in the brain. In one of them my attention was called to CUPRUM by frequent attacks of convulsive cough, with extreme blueness of the face, resembling whooping cough, when-

ever she took cold.—*GLONOINE* resembles *BELLADONNA*; it often is serviceable in petit mal.—*HYDROCYANIC ACID* is helpful in epileptiform convulsions rather than in true epilepsy. T. F. Allen says: Epileptic attacks preceded by nausea, vomiting, or waterbrash. In recent cases.—*HYOSCYAMUS* covers the same ground, i. e., there is violent convulsive action, but not true epilepsy. Yet, in several recent cases, in children, it has rendered me good service. I have found it especially useful when the spasm leaves the patient with a severe, stupid headache, slightly wandering, inclined to talk a good deal, or with long-continued stupor. In patients who regularly present these symptoms a spasm is sometimes preceded by a similar headache, with livid face and rather sparkling eyes, dizziness and ringing in the ears; if so, five-drop doses of the mother tincture in water, repeated once or twice, have aborted the threatening seizure.—*IGNATIA*, like *ASA FÆTIDA*, *MOSCHUS*, *NUX MOSCHATA* and *NUX VOMICA*, does not directly affect the spasm, but I have rarely managed a case of epilepsy in which these remedies were not frequently demanded by the symptoms of the case. When there is much nervous tension and irritability, *IGNATIA* is invaluable. The indications for these remedies are familiar to all.—*CENANTHE CROCATA*, so highly praised by Hale and others, has in my hands proved without the slightest value. I am compelled to report the same concerning *SOLANUM CAROL.*, which I have given in every possible dose without the slightest beneficial effect. In one case it seemed to arrest the paroxysms, but mental enfeeblement progressed with astonishing rapidity.—*ZINCUM* has done good service in some cases of infantile epilepsy, and is thought to be of value, upon theoretical grounds, in cases induced by cerebral exhaustion. The profound action of this metal upon the brain and nervous system generally warrants the hope that it may be found useful in the treatment of complications and effects of epilepsy involving the nerve centres. In the epilepsy of children and in recent cases all the remedies producing marked convulsive action are to be studied (see also hysteria). *CINA*, *CHENOPODIUM*, *STANNUM* and *INDIGO* are particularly useful when there is irritation from intestinal parasites.

INFANTILE CONVULSIONS (Eclampsia).

Infants and quite young children are frequently the subjects

of violent convulsions, varying in severity from slight jerking and twitching of the face and extremities, without loss of consciousness, to spasms which in every respect resemble epilepsy. The general predisposition to eclampsia on the part of infants undoubtedly rests upon the incomplete development of the nervous system at this tender age. Special predisposing causes may be found in an inherited instability of the nervous system and in such constitutional states as rickets (seen in from 30 to 40 per cent.), anæmia, and great physical weakness. The exciting causes are chiefly reflex. Of these, the irritation arising from dentition (irritation in the 5th pair), especially in feeble children and during the first six months of life, and that due to an overloaded stomach or a stomach filled with indigestible food, are clinically of particular importance. Other causes are: otitis, phimosis, adherent prepuce or clitoris. It is generally recognized that in fevers of children convulsions largely take the place of chills in adults; there are infants in whom even a slight fever is sure to excite convulsions. This peculiar tendency is especially noticeable in infectious fevers, particularly in scarlet fever, measles, malarial fever and pneumonia, the onset of which is often marked by violent general convulsions. Again, convulsions occur in connection with meningitis, simple and tubercular, spinal paralysis, tumors and other cerebral lesions; rarely, if ever, from simple cerebral congestion. Not infrequently they are seen in the late stage of entero-colitis. Scalds, burns, fright, anger, or any unusual excitement may be followed by eclampsia. Convulsions may occur soon after birth, and then are usually the result of injuries received during labor, as meningeal hæmorrhage from the use of forceps, or of congenital disease (heart disease or atelectasis).

Symptoms—Infantile convulsions may be local or general. The *local* form finds its type in laryngismus stridulus, which is elsewhere described, and which may be accompanied with general rigidity or exceptionally may terminate in general convulsions.

General convulsions may be preceded by restlessness, especially during sleep, starting and crying in sleep, twitching of muscles and grinding of teeth; oftener their onset is sudden and unsuspected. There is sometimes a sharp, warning cry, followed by spasmodic action in the (right) hand; then tonic

rigidity of the body, with fixed, staring eyes; cessation of respiratory movements and lividity of the face; these are soon succeeded by general clonic movements with convulsed face, firmly closed jaws, rolling of the eyes, retraction of the head, and violent twitching or rhythmic flexure and extension of the arms. There may be frothing at the mouth and escape of bloody saliva from the mouth; the pupils are usually dilated; the face is livid, sometimes pale. After a time, in from one to three minutes, the convulsions gradually cease and the child passes into a sleep of profound exhaustion or stupor, from which it awakens in half an hour or hour. Consciousness is always lost when the convulsions are general. The temperature is normal in laryngismus stridulus, but is raised when the convulsions are general. Exceptionally convulsions may rapidly succeed each other as in the status epilepticus; such cases are characterized by high fever. Death may occur from asphyxia, exhaustion, or central cause; exceptionally paralysis may result from hæmorrhage of the meningeal vessels.

Diagnosis.—The diagnosis deals with the probable cause of the convulsive seizure. As stated, when convulsions occur soon after birth, they are the result of congenital disease or of injury received during parturition. In a child more than six months old the cause probably lies in difficult dentition or gastrointestinal irritation. If localized, i. e., limited to one side or one extremity, they indicate a localized organic lesion in or near the motor cortex. The presence of high fever and vomiting is characteristic of brain lesion or the onset of scarlet, or other infectious, fever. If convulsions set in some weeks after the cessation of an eruptive fever, or if no satisfactory explanation can be found, the urine should be examined for albumin. If convulsions appear after the second year, without apparent cause, in a child which otherwise seems healthy, epilepsy may be suspected.

Prognosis.—Convulsions in children must never be treated lightly. Frequent recurrences, it is true, do not necessarily mean permanent ill health or death, but the first paroxysm may prove fatal. If reflex or occurring as a complication of rachitis, the prognosis is favorable. If occurring at the onset of eruptive fevers, they are less serious than when occurring later; in scarlet fever they always constitute a threatening

feature. If complicating the last stage of cholera infantum, especially in a child which lacks in vitality or which is unusually exhausted, the prognosis is bad. General convulsions in laryngismus stridulus and in toxæmia are very serious. Hyperpyrexia with convulsions is a grave symptom.

Treatment.—The treatment of the individual case is governed by the cause of the convulsions. When the stomach or bowels are overloaded, they should be promptly emptied; vomiting may be produced by tickling the fauces, but there is an element of possible danger from food entering the windpipe. Should the gums be hot, badly swollen, painful and tough, lancing is advised; I share the increasing prejudice against this seemingly inoffensive measure, because I never have seen good come from it. Firm pressure over the abdomen, when the first symptoms of a seizure appear, is a favorite measure of old nurses, and often aborts an attack. A tepid bath, not hot, is always in place; if, for some good reason, it cannot be given, a mustard foot-bath is a good substitute. Hyperpyrexia calls for hydrotherapy; cool packs, repeated, are recommended; I prefer a warm bath, followed by wrapping the child in a sheet wrung out of tepid water, with a flannel outside, to be repeated when necessary. During the convulsion the child should not be restrained; its true position is across the knees of the nurse, resting on the abdomen. A few whiffs of chloroform are effective in controlling the severity of the convulsions.

BELLADONNA is indicated frequently and nearly always acts promptly. It is useful in the convulsions of scarlet fever, measles, meningitis, difficult dentition, and gastric irritation. The face is congested and hot; the convulsions violent, with frothing at the mouth. Teething is difficult and the mouth and gums are hot, red, dry, swollen; there is fever, with restless sleep, interrupted by frequent starting and jumping, with twitching of limbs; the head is hot and the child lies with half closed eyes, rolling and restless; the pupils are dilated. (GLONIN bears a close resemblance to BELLADONNA and gives rise to violent cerebral congestion, but it is nevertheless of slight value here).—**CUPRUM**. Localized or general convulsions. Convulsions during the late stage of eruptive fevers, especially scarlatina, and when there is retrocession of the rash. Meningitis. Laryngismus stridulus. The convulsions begin with contractions in

fingers and toes, and become violent in character. The child bites the spoon when efforts are made to give it medicine. The bodily surface is cool and bluish.—*CINA*. Invaluable when convulsions occur from intestinal irritation caused by the presence of worms. Tonic rigidity is pronounced during the fit; pallor of the face. The typical *CINA*-patient has hard and distended abdomen and is a voracious, though somewhat fitful, eater; he is nervous, fretful, excitable and aggressively cross, striking at his nurse, and hard to take care of; there is picking at the nose, muscular restlessness, enuresis; the face is hot and red, or red on one side, pale on the other; often great pallor about the mouth and nose.—*CICUTA* is not so frequently indicated, but is serviceable when convulsions are caused by worms, indigestion (œsophageal spasms from worms) or by meningeal inflammation. The convulsions are tetanic, involving the muscles of the face and the whole body; the child lies insensible, with staring eyes, face red, hot and sweaty; frothing at the mouth; convulsions are brought on by the slightest jar.—*OPIUM* is suggested in the rarer cases where an apoplectic state exists. The face is purplish and breathing stertorous. The body is hot and bathed in a hot sweat. Convulsions from fright, beginning with a loud cry. In children who are habitually constipated and in whom soap-and-water injections have been daily used.—*STRAMONIUM*. In the suffocative spasms of severe whooping cough, with tendency to convulsions; from fright. Decidedly choreic action; the limbs are in constant convulsive motion. The child appears strangely nervous; the slightest disturbance, as the approach of a stranger, frightens it out of its wits and threatens to bring on spasms.—*ZINCUM* must be studied in the convulsions of anæmic teething children, partaking of the nature of epilepsy, when there is reason to suspect cerebral disease.—*NUX VOMICA* suggests itself when the convulsions are tetanic in character and caused by indigestion.—*ÆTHUSA* has cured the convulsions of cholera infantum, so-called, when there was present vomiting of large, solid chunks of curdled milk.—*ACONITE* is indicated by its characteristic excitement and anxious tossing about, with fever, heat, and thirst; it is useful when the convulsions occur during the onset of an eruptive fever or from fright. It is differentiated with difficulty, in these cases, from *BELLADONNA*; it covers a narrower field of action

than BELLADONNA, with less active congestion, not yet localized.—GELSEMIUM is suggested when convulsions occur in children who are living in malaria-infected countries, in which case important objective symptoms of the remedy can be recognized, as: great prostration, with almost paralytic weakness of the extremities; fever with much heat and hot sweat; the child lies half-stupid, indifferent to everything about it; acts as though it felt dizzy; pupils usually dilated. It is said to be useful in the convulsions of measles, with catarrhal symptoms of the eyes, nose and throat.

PASSIFLORA has been used empirically, in large doses, and favorable reports of its action have been published. I have no experience with it.

ACUTE CHOREA (St. Vitus's Dance).

The term "choreic movements," according to H. C. Wood, is applied to "irregular movements produced by independent contractions of single or associated groups of muscles, not vibratory in character, and more or less simulating purposive movements, but never forming a complicated series of apparently purposive actions. They may vary in intensity from the slightest irregular movements of the fingers or toes, or even a mere condition of excessive muscular activity resembling restlessness, up to the most severe and violent motions. They may be confined to a single group or to associated groups of muscles (*local chorea*) or may affect the entire muscular system (*general chorea*). When the whole body is affected, the muscular contractions do not take place regularly or consentaneously, but momentarily, here or there. In some cases they are under the control of the will for a short period of time, but always arrest themselves in a few minutes. The choreic movement is usually irregular, but it may be rhythmical. *Rhythmical choreas* more or less closely resemble tremors, differing chiefly in that the movements are much slower and more extensive."

Acute chorea (Sydenham's Chorea) or St. Vitus's dance is a non-febrile disease, chiefly of children, characterized by general choreic movements with loss of nerve-energy and muscular power and by psychical disturbances.

Ætiology.—St. Vitus's Dance in about eighty per cent. of all

the cases occurs between five and fifteen years of age and at least twice as often in girls as in boys; it is, however, occasionally seen in infancy and later in life. It is infrequent among the negroes and not known among the Indians. The greater number of cases occur during the months of spring. A family tendency to chorea undoubtedly exists in many cases. A history of *rheumatism* is often found, arthritic affections either having preceded chorea by some months or years or being immediately associated with it; the frequency of organic disease of the heart in both diseases emphasizes the close connection between them. In a majority of cases the *neuropathic* tendency is evident; hence, any influences or conditions which irritate or tax the nervous system may become exciting causes; thus fright, worry, grief, mental trouble of any kind, injudicious application to school-work, and unwholesome living, as found especially among the children of the poor, are important factors. To these may be added the exhaustion following infectious diseases of childhood, as scarlet fever or, according to Sturgis, whooping cough, injuries or slight operations, also *reflex* irritation, as from worms, phimosis, hooded clitoris, etc. Among adults, *pregnancy*, particularly the first five months of a first pregnancy in a woman less than twenty-five years of age, is classed among the less frequent causes. Chorea also occurs occasionally after abortion or delivery at full term.

Morbid Anatomy and Pathology.—The essential anatomical cause of chorea has not yet been discovered. No constant lesions in the nervous system have been found. In very many cases endocarditis, nearly always simple, sometimes ulcerative, is seen after death, associated with embolism of the smaller arteries of the brain. So frequent is this that Kirkes, and others, believe that cerebralembolism constitutes the distinctive pathological feature of the disease. However, endocarditis, though a frequent, is by no means a constant feature of chorea, and when present is not always associated with the existence of cerebral embolism.

The independence of chorea of profound organic changes in the brain is proved by the short duration of the disease in some cases and its rapid recovery; on the other hand, the absence of fever and the occurrence of chorea chiefly at a time of life when the nervous system is particularly sensitive and irritable, and

in persons of the female sex, whose nervous organization, as a rule, is more easily disturbed than that of men,—these facts are cited in support of the theory that the root of the disease lies in the irritable state of the nerve centres which control the motor apparatus. The latter view appears plausible. The existing irritability of the nerve centres may be caused by hyperæmic, anæmic or psychical influences or irritation from the periphery or centre. H. C. Wood believes that the essential pathological feature of chorea lies in an altered nutrition of the ganglionic structures of the cerebro-spinal axis, sometimes not sufficient to produce structural changes recognizable under the microscope, in other cases capable of giving rise to pronounced structural changes. The theory of the microbic origin of St. Vitus's dance is not yet substantiated by facts.

Symptoms.—While acute chorea may be sudden in its onset, it is usually preceded by general indisposition, digestive disturbances, often headache, and sometimes pain in the limbs, associated with a peculiar restlessness and inability to keep still for any length of time which is well expressed by the common term “fidgets.” With it there is more or less peevishness and irritability, often in striking contrast with the previous even disposition of the child. The first symptom of motor disturbance shows itself in the hand, most frequently at the table, where the patient unexpectedly drops and breaks glasses or plates; the face soon afterward becomes involved. In slight cases the affection is limited to one limb, or to the face and one limb, with no marked constitutional symptoms.

In severe forms the *muscular incoördination* is sufficient to render the patient helpless. He is wholly unable to control the muscular movements, which spread from the arms and face to the legs and head, later involving those of the trunk; these may be general or one-sided (*hemichorea*), with a preference for the right side of the body, or they may affect one arm and the leg on the opposite side. In such cases the arms are constantly and grotesquely thrown about in every direction, rendering it impossible for the child to dress or feed herself; the legs are affected in the same manner, and attempts to walk result in irregular, jerky movements in almost any direction, frequently lateral or zigzag, but always beyond the control of the patient; the face is distorted into constantly and rapidly changing

grimaces; the tongue may be thrust about the mouth or rapidly forward, at times causing a clucking or clacking sound; the head is jerked forward or backward, to one side or the other, sometimes quickly rotated; speech becomes laborious and indistinct from difficult articulation, and may degenerate into a mere jumble of sounds without meaning, if the discouraged child does not eventually cease all efforts to talk; mastication and deglutition in some instances are seriously interfered with; involvement of the respiratory muscles, which usually occurs last and in some cases when speech is not affected, gives rise to paroxysms of hard, labored, sighing, sobbing breathing. The choreic movements may be of sufficient violence not to allow the child to lie on the couch or in bed unless held there by straps. During sleep the movements usually cease, but the difficulty of going to sleep may be so great as to rob the child of much-needed rest and greatly add to the already existing debility. There is an increase of electric irritability of nerve and muscle on the affected side. Pain is rare, save when arthritic complications exist, although in some cases, especially of hemichorea, there may be severe pain even in the absence of rheumatic complications. Soreness to pressure is not uncommon, and "tender" points are present in some cases. There may be tingling and prickling sensations; anæsthesia is infrequent.

Psychical disturbances are rarely severe. They usually consist of the irritability and peevishness already described. Sometimes there is acute melancholia; hallucinations of sight and hearing are somewhat characteristic of hysterical cases; occasionally there is loss of memory and intellectual power, which very rarely may progress to dementia. In exceptionally severe cases mania may suddenly appear; as in the case of adult women (pregnancy), it constitutes a very threatening symptom. *Fever* is quite rare, save when chorea is associated with arthritis; moderate fever may result from unusual nervous excitement in a fretful, sensitive child. *Cutaneous* affections usually depend upon the presence of rheumatic troubles; but, independent of these, we may find herpes zoster, erythema nodosum and purpuric urticaria. The subcutaneous fibrous nodules which British observers describe occur in cases associated with rheumatism.—The *Heart*. There is rarely pain,

but rapidity of the heart's action is common. Murmurs may be heard; of these the soft, blowing systolic murmur at the base or apex is common in anæmic girls. The frequency of chronic valvular lesions and of acute endocarditis in choreic patients must be borne in mind, but it must also be remembered that *post-mortem* examinations have repeatedly demonstrated the absence of valvular lesions when the characteristic murmurs had existed during life. It has been suggested that in such cases the murmurs are due to irregular contractions of the chordæ tendinæ which prevents the proper closure of the valves. Osler gives the following hints: "In thin, nervous children a systolic murmur of soft quality is extremely common at the base, particularly at the second left costal cartilage, and is probably of no moment. A systolic murmur of maximum intensity at the apex, and heard also along the left sternal margin, is not uncommon in anæmia, enfeebled states, and does not necessarily indicate either endocarditis or insufficiency. A murmur of maximum intensity at apex, with rough quality, and transmitted to axilla or angle of scapula, indicates an organic lesion of the mitral valve, and is usually associated with signs of enlargement of the heart. When in doubt, it is much safer to trust to the evidence of eye and hand than to that of the ear. If the apex beat is in the normal position, and the area of dulness not increased vertically or to the right of the sternum, there is probably no serious valvular lesion. The endocarditis of chorea is almost invariably of the simple or warty form, and in itself is not dangerous; but it is apt to lead to those sclerotic changes in the valve which produce incompetency. Pericarditis is an occasional complication of chorea, usually in cases with well marked rheumatism."

Duration and Prognosis.—The duration of the average case is from two to three months, but in many cases recovery progresses much more tardily. Recurrences are proverbially frequent; it seems probable that this arises from the continued existence of the cause or causes which brought on the first attack, and from increased irritability of the affected nerve centres from the attack itself; cases associated with rheumatism are especially liable to recurrences. The muscular exhaustion and the mental dullness which are common features of chorea hardly ever prove permanent. According to Ranney, marked

insomnia has an unfavorable effect upon the prognosis. Death from chorea rarely occurs in children; the most carefully compiled statistics place the rate of mortality at less than two per cent.

Diagnosis.—It should not be difficult to recognize St. Vitus's Dance, save in rare cases occurring in adults. The antagonism between the spasmodic movement of the muscles and the willed effort is always apparent; the child may will to do one thing, but is irresistibly compelled to do something else; thus, she may at the table endeavor to carry a spoon to her mouth, but the choreic action of the muscles carries it to her cheek or forehead. *Reflex chorea* has points of irritation, as eye-strain, adherent prepuce or clitoris, nasal affections, etc. *Habit-spasms* are more or less under the control of the will and are more deliberate than those of St. Vitus's Dance. In *hysterical* chorea the movements are more rhythmical, and there is a pronounced tendency to rigidity of the affected muscles; the hysterical state is usually recognized without difficulty. In *paramyoclonus multiplex* the spasms are bilateral, symmetrical, occur at intervals and are very violent, but the muscles of the body and of the proximal portions of the limbs are involved. During the intervals, fibrillary tremors of the affected muscles. The disease occurs at any age.

Treatment.—Pains must be taken to give to all children of a neurotic tendency an abundance of out-door life, so as to make them rugged and hearty, and not to allow too close application to school-room work; by such means a predisposition to functional disease of the nervous system, including chorea, may be overcome. Chorea having declared itself, even though in a very mild form, the patient must at once be taken out of school and secluded so far as possible. If the spasms are at all severe, she should be kept in a recumbent position a good portion of the time, as quiet as possible in body and mind. Play-things should be allowed in bed; if too fretful to remain in bed, the child, dressed warmly, may be allowed to play on the floor, but must not run about the room. The presence of other children in the room excites the patient and must be forbidden. It is well to carefully examine the patient for possible sources of irritation (eyes, nose, genitals, etc.) and remove them at an early date. If there are signs of involvement of the heart, rest is doubly necessary. Rheumatic symptoms suggest the use of

appropriate medication. The bowels should be kept open and the child fed regularly and abundantly; fats, cream, butter, olive-oil and cod-liver oil are strongly indicated. Long-continued warm baths are helpful; they should be given at a temperature of 95° to 100°. Gentle massage, with olive-oil or cocoa-butter, should be given daily. If troubled with sleeplessness, use hot sponge-baths or the hot bath; hypnotics should not be employed save as a last resort. If the paroxysms are very violent, the bed should be thoroughly padded, so as to protect the child against injury; it may be necessary to strap the child down, but there are serious objections to this measure, and it should not be employed if it can possibly be avoided. Inhalations of chloroform may have to be used to control the spasms. In some tedious cases the rest-cure is often followed by rapid improvement; others demand a change of air (when possible, nearness to the seashore). During recovery great care must be used to maintain continuous improvement and to guard against relapse. Here, also, quiet, abundant and appropriate feeding and passive exercise (bathing, rubbing, massage, carefully graded gymnastics in the room and *alone*) are very important. The friends must always be cautioned against the probable recurrence of the disease.

Electricity is recommended by authorities; it has not been of service in my hands. Bartlett speaks highly of Dana's method, i. e., anodal galvanization of the brain. "The positive electrode, well moistened, is placed over the motor area on the side opposite to the one most severely affected by the movements. The negative electrode is then placed in the choreic hand. A mild current is permitted to pass without interruption for two or three minutes. If both sides are affected, then the sides of the electrodes are reversed, the positive one being still kept to the head, and the negative to the hand."

Therapeutics.—**AGARICUS** is one of the most important remedies. It is indicated when there is anæmia of the brain and cord; the choreic movements may occur in single muscles or be general; they are sometimes on opposite sides, i. e., right arm and left leg, and *vice versa*. The movements vary in intensity from slight twitching of muscles to energetic, convulsive movements of the entire body. The spasms cease during sleep, but there is much jerking of muscles while she is going to sleep.

The remedy has among its indications spasm of the muscles of accommodation and much twitching of the eyes and lids; twitching about the mouth and lips; herpetic eruption and soreness about the lips; tumultuous, excited action of the heart; copious emissions of inodorous flatus; burning-itching and redness of the skin, as though after a frost-bite.—**AGARICINE**, in the lower triturations, is at present a popular empirical remedy in chorea.—**CUPRUM**. Choreic movements very violent, almost convulsive; cerebro-spinal irritation; from fright, often with strongly marked hysterical manifestations. Spasms begin in the fingers and toes, are usually better from lying down, but continue somewhat during sleep. Difficulty of deglutition and of breathing from involvement of the muscles of the throat; cramps in the stomach and violent vomiting. Chlorosis, periodical chorea; painful cramps in the calves of the legs; paresis after chorea.—**IGNATIA**. In emotional children, with characteristic mental state, faintness, debility excitability, "sinking" sensation at the stomach, great gastric flatulency. Spasms of the eye-lids (asthenopia); spasms of the facial muscles, brought on by attempts to speak. Tenderness to pressure along the spine. Incontinence of urine. Aggravation from any emotional excitement; from threats of punishment.—**HYOSCYAMUS**. General convulsive action strongly pronounced; every muscle of the body twitches and jerks; the arms are thrown about violently. Mental excitement; child is unreasonable, easily provoked to anger, demonstrative and violent; periods of excitement followed by great exhaustion. Choreia of pregnancy, with horrible dreams from which she awakens terribly frightened; sees vermin, bugs, hideous faces, etc., as soon as her eyes are closed. (Many practitioners prefer hyoscyamine and hyoscine.)—**CIMICIFUGA**. Spinal irritation, muscular rheumatism, with first appearance of menses, with aggravations during menstruation; irritable spine. Great mental depression. Choreia brought on by fright choreia of pregnancy, with pronounced melancholy. Sleeplessness. Choreia of the left half of the body.—**VERATRUM VIRIDE**. In cases characterized by violent congestion; spasms almost tetanic; tumultuous action of the heart.—**ARSENICUM**. Of the greatest importance in tedious cases with profound anæmia, melancholy, weak and rapid action of the heart, restlessness and anxiety. The high

place it holds in the estimation of the dominant school in the treatment of chorea is based upon the homœopathicity of arsenic to this condition.—CALCAREA CARBONICA frequently does surprisingly good work by its profound action as a corrector of malnutrition; its well-known constitutional indications must be present. The choreic movements rarely are violent, but the case is tedious in the extreme.—SULPHUR is similarly useful when there is a scrofulous taint, especially when the child is thin, badly nourished, has dry, unhealthy skin, and suffers from chronic constipation.

Other remedies to be consulted are: GELSEMIUM. Great muscular weakness; paresis.—CAUSTICUM. Paralytic tendency; aphonia; heavy, mumbling speech; weakness of the bladder; chorea affecting the eye-ball and the right side.—TARENTULA. Spinal irritability; nocturnal chorea; choreic movements of the extremities; the movements are violent and jerky.—PHYSOSTIGMA. Cardiac chorea; spinal irritation, tetanic rigidity of muscles.—ZINCUM. Choreia with incessant movements; mostly twitching, especially during sleep, the feet particularly affected. (T. F. Allen.) Anæmia.—NUX VOMICA. Characteristic gastric symptoms; spinal irritation.—CINA and SPIGELIA. Irritation from intestinal worms.—RHUS. Rheumatic cases, with muscular fatigue and soreness.—PULSATILLA. In chlorotic and hysterical young girls, with characteristic mental symptoms and menstrual disturbances.

OTHER AFFECTIONS CHARACTERIZED BY CHOREIC MOVEMENTS.

Reflex chorea consists of local or general choreic movements which are due to peripheral irritation, usually the presence of intestinal worms, neuromatous tumors, decayed teeth, nasal deformities, rarely phimosis, adherent prepuce or clitoris, or disease of the orifices of the body. Reflex chorea is not as common as has been thought. In all cases a predisposition to the disease exists, stimulated into active manifestation by the immediate, exciting cause. The symptoms are those of St. Vitus's Dance. Removal of the cause, aided by the administration of the symptomatically indicated remedy, is followed by rapid improvement and a cure. Here also belongs the *chorea of pregnancy*, of which the pregnant state itself, the condition of the blood and the special demands made upon the

vital forces of the mother are the exciting causes. The seriousness of this form of chorea arises largely from loss of sleep and the extreme physical exhaustion resulting from it. Attacks of mania may occur. In this form energetic measures are demanded. Abundant feeding is absolutely necessary and stimulants may be freely used. To afford sleep, chloral and opium may become indispensable. Since the life of both mother and child are endangered, it is often necessary to save the mother at the sacrifice of the fœtus; when this necessity presents itself, measures to produce an abortion should not be deferred too long.

Chorea major or *pandemic chorea* is simply an hysterical state with choreic movements and wild excitement of a religious character. Epidemics of this sort were common in the middle ages, and have occurred among the early settlers of Kentucky. In the parlance of the common people the term "St. Vitus's Dance" refers to this affection rather than to acute chorea.

Electrical chorea (Dubini's disease) has been observed in Lombardy and some parts of Italy. It derives its name from the peculiar contractions of the affected parts, which closely resemble the contractions produced by the interrupted galvanic current. The choreic movements usually begin in one arm, extend to the leg of the same side, then invade the other side of the body. Exhaustion and atrophy of the muscles are followed by paralysis and death. This form is very rare; nothing positive is known of its ætiology (malaria?) or pathology.

Habit spasms are seen in rapidly growing children of neurotic tendency, oftenest between the seventh and fourteenth year of age. There are odd, peculiar movements, as the periodical lifting of one eye-brow, or a shrug of the shoulder, or a grimace, or protrusion of the jaw, or a short inspiratory sniff. It is in reality a habit, the result of an unexplainable dominating impulse, and shows itself particularly when the child is laboring under excitement of some sort. The affection is usually transient, passing away sooner or later, and deserves no notice save as it should call attention to an unpleasant habit of the child and to the possible danger of more serious trouble. It is on this account that a careful examination of the child is justified.

Tic convulsif or *Gilles de la Tourette's disease*. This affection

is characterized by choreic movements, almost explosive, involving usually the facial and brachial muscles, but sometimes general. With it are produced explosive sounds, sometimes resembling a bark or cry. The patient mimics words (*echolalia*), repeating them over and over again, and in some cases actions (*echokinesis*); or she may get into the habit of using profane and obscene words (*coprolalia*); these nearly always occur when the involuntary movements are made. In some instances a monomania develops. Thus Osler relates the case of a young girl in whom the choreic movements were very slight, but who had become an arithmomaniac. Every act of hers was preceded by counting a certain number of figures. For instance, before going to bed, or taking a glass of water, or combing her hair, she had to count up to a certain number. Such cases occur in strongly neurotic families, in children or young persons, and are not readily amenable to treatment.

Saltatoric spasm, described by Bamberger, consists of violent contractions in the muscles of the legs when attempting to stand, producing a jumping, springing motion. It occurs in neurotic persons and is transient, though occasionally it may persist for years. The terms *myriachit*, *latah*, and other provincial names, are applied to a condition of which the so-called "jumping Frenchmen" of Maine and Canada are fair types. The patient jumps violently and utters a loud cry when startled by the slightest sound or touch; there is a tendency to mimic words or actions; sometimes any command given is unhesitatingly obeyed. The affection prevails in certain families, and allied forms have been observed in Russia and Java.

Huntington's chorea. Chronic Chorea.—This affection consists of irregular choreic movements, beginning in the hands, gradually becoming general; they are of a disorderly, irregular, incoördinate character, differing from the abrupt energetic movements of acute chorea. It is frequently, but not always, hereditary, usually sets in between the thirtieth and fortieth year, and is accompanied with mental enfeeblement drifting into dementia. The hesitating, disorderly character of the movements is striking. In the face it gives rise to seemingly labored, involuntary grimaces; the speech is slow, indistinct, the walk unsteady and swaying, like that of a drunken person. Since Huntington first described the affection, other cases

have been observed in this country. The disease seems to be the result of organic changes in the brain which are not yet understood; it is incurable and of very long duration.

Rhythmic chorea is largely hysterical in character. It may affect any part of the body, limbs, face, tongue, larynx, abdominal muscles (salaam convulsions), muscles of respiration, etc. The choreic movements not infrequently slowly assume the deliberate, purposive character of hysteria.

TETANY (Tetanilla).

A nervous affection of unknown pathology, characterized by tonic spasms in certain groups of muscles, nearly always bilateral, usually occurring in the extremities, without loss of consciousness.

Ætiology.—Tetany is a disease of childhood and early adult life, slightly more frequent in males than in females, and usually associated with an inherited neurotic tendency. It is rare on the American Continent. The greater number of cases are seen in connection with a low state of vitality. Thus, in children the process of dentition, or rickets, or chronic gastro-intestinal disease favor tetany, while in adults prolonged lactation, fevers, etc., are among the important causes. Tetany has followed removal of the thyroid gland and has occurred in connection with dilatation of the stomach, especially after washing out the stomach. An acute, epidemic form (rheumatic tetany), of two or three weeks' duration and favorable termination, has been observed in Europe.

Symptoms.—The prodromal stage, occupying from several days to a week, consists of some pain in the extremities, with coldness and formication, sometimes vertigo, ringing in the ears, nausea, and sense of great fatigue. The paroxysms may appear at any time; they usually first attack the arms and fingers, and may be confined to them. If in the arm, the flexors of the fingers and wrist are contracted, the hand assuming the shape in which the obstetrician passes it into the vagina (Trousseau); if all the muscles of the arm and shoulder are involved in the spasm, the forearms are flexed and crossed in front. If the legs are affected, the feet are distorted, usually violently extended, the toes pointing downward, the big toe drawn under the other toes, and the thighs strongly adducted.

The muscles of the trunk are rarely involved; if so, there is oposthotonos or pleurosthotonos, or the spine may be bent forward. Cyanosis and a sensation of being choked results from involvement of the muscles of the neck, and serious respiratory embarrassment from spasm of the respiratory muscles; the latter, however, is observed only in exceptionally severe cases. The affected muscles are hard, stand out prominently, and are sensitive to pressure. During the spasms fibrillary movements have been observed. It is said that the spasms may be overcome by the force of the will, but that they return as soon as the effort of the will ceases. The duration of the attack varies, lasting from a few minutes to several days, and even months or years, with a strong tendency to recurrence at longer or shorter intervals. The course of the disease is comparatively painless, but there is often tingling, coldness, and moderate neuralgia.

There is increase of electrical irritability of the affected motor nerve (Erb) and increased excitability of the sensory nerves, with paræsthesia in the region of its distribution from slight pressure (Hofman). Trousseau points out that any time during tetany obstruction of the circulation by compressing the affected parts in the direction of their principal nerve trunks or blood vessels will bring on an attack within a few minutes, which disappears soon after the pressure has been removed. Chovestek has shown an increase in the mechanical excitability of the motor nerves; a slight tap in the course of the nerve will cause violent contraction in the parts under its control.

Diagnosis.—Tetany may usually be recognized without difficulty. It bears some resemblance to hysteria, but in hysteria the contractions are unilateral, there is no increase of electrical irritability, pressure upon the parts (Trousseau's symptom) does not cause spasm, the patient is usually of the female sex, and there is the history of hysteria. *Tetanus* presents a picture of intense tonic rigidity, lockjaw, and a history of traumatism.

Treatment consists of measures which will improve the general health of the patient and of the exhibition of the symptomatically indicated remedy. The patient must, if possible, be placed amidst favorable hygienic surroundings, be fed abun-

dantly on wholesome, nourishing food, and be directed to take systematic moderate exercise. Cold sponge-baths, massage, and cold applications to the spine are helpful. General faradization has yielded good results. The thyroid-extract treatment has been recommended, if other means fail.

PARALYSIS AGITANS.

Paralysis agitans (Parkinson's disease, Shaking Palsy) is a chronic affection of the nervous system, of unknown pathology, usually seen in persons of advanced years, associated with muscular weakness, tremors, and rigidity.

Ætiology.—This disease occurs oftenest between fifty and sixty, rarely before forty, years of age. Heredity is not important, save as an inherited neurotic tendency may predispose to it. Men have it oftener than women. It is known to have followed powerful emotional disturbances, bodily injury, especially when received during a time of emotional excitement, prolonged worry, and exposure to severe cold. Alcohol, syphilis and venereal excesses do not cause it. The majority of cases develop without apparent cause, leaving the impression of a condition of premature senility. It is not an uncommon affection; very exceptionally cases have been observed in early manhood.

Symptoms.—In rare cases the onset is sudden, following some powerful emotional agitation, but usually the approach of the disease is insidious and gradual. The first thing noticed are tremors in the hand or foot, usually in the fingers and hand; if in the hand, they after a time extend to the leg on the same side of the body, and then to hand and leg of the opposite side. The tremors may be constant or intermittent, or marked only during rest after some exertion; at first they may be controlled by an effort of will, and are suspended by voluntary movements. As they extend from limb to limb, this controlling influence of the will is lost, and they finally persist during both action and repose. The forearm is usually slightly flexed, as is also the hand, while the fingers are in the position which they assume when holding a pen or as though rolling a pin between the forefinger and thumb. In the leg, the ankle especially is affected. Later, and more rarely, the head may begin to

shake, usually vertically. There is no interference with eating and swallowing, but dribbling of saliva may result from loss of power in the lips and from the attitude of the head, which is bent forward; the face eventually assumes a fixed, sad expression, and the voice grows monotonous, sometimes piping; speech often at first is slow and labored, but becomes rapid after the sentence is well under way. The tremors are short and rapid, about five oscillations per second; they are increased by excitement. Great muscular weakness develops after a time, with, often, severe aching in the affected muscles, as though from excessive weariness. The attitude and gait of the patient are peculiar. He stands with the body bent forward, the arms flexed and away from the body, the hands usually turned toward the ulnar side, with contractions at the elbows, knees, and ankles in the late stage of the disease. He arises from the chair with the body, especially the head, bent far forward, rendering the act difficult and awkward. The gait is characterized by this same peculiar forward inclination of the head and trunk; at first the movement is deliberate and slow, but there is progressive increase in the rapidity of the gait (*festination*), as though from a forward displacement of the centre of gravity, the patient, seemingly to keep from falling, walking faster and faster, and finally breaking into a run, until he actually falls or manages to save himself by grasping some stationary object. In some cases there is retropulsion or walking backward, with tendency to fall backward. The typical attitude and gait depend upon rigidity and fixation of the parts, which in the early stage and in the less developed form gives rise to slowness and clumsiness of voluntary movements. Frequently the patient in the advanced stage complains of dull aching in the muscles, as though from exhaustion following overexertion, but there is very little real pain. A sensation of great heat is not unusual, and there is occasionally habitual sweating. The surface temperature may be materially raised. The urine is deficient in sulphates and, according to some observers, notably Cheron, rich in phosphates.

The *course* of the disease is very slow and progressively downward, without hope of permanent improvement or cure. After years, enfeeblement of the intellect occurs in the majority of cases, with innutrition, great emaciation and bodily ex-

haustion, the patient, in the absence of some fatal intercurrent disease, dying from asthenia.

The diagnosis is easy, save perhaps in the exceptional cases without tremors; but even in these the fixed "masked" face will establish the nature of the affection. *Senile tremors* might be mistaken for the tremors of shaking palsy, but in these the head shakes harder and at a slower movement, and there is much trembling of the tongue and lower jaw.

Treatment.—This consists chiefly of measures which insure quiet and prevent every avoidable exertion of body and mind. The question of using nerve sedatives when the disease is well advanced is a practical one, and should be answered promptly in the negative, exceptions being made only in extreme cases and after a faithful trial of every other means; in such exceptional cases it may be well to follow Wood's plan of giving one dose of hydrobromate of hyosine at night. Hot baths usually have a soothing effect. Electricity is used in various forms, the authorities being divided as to its merits and the methods of applying it. I am prejudiced in favor of daily faradization of the spine, using a moderate current for ten or twelve minutes.

The actual value of medication here has not yet been determined. A careful examination of the clinical experience recorded by the entire profession leaves the impression that nothing positive has been accomplished by the administration of medicines. GELSEMIUM, PHYSOSTIGMA, BARYTA, PLUMBUM, MERCURY, RHUS TOXICODENDRON, PHOSPHORIC ACID, PHOSPHORUS and PICRIC ACID should be studied.

TRAUMATIC NEUROISIS.

A neurasthenic state caused by injury or shock. It is also called spinal neurasthenia, spinal concussion, railway spine (or railway brain).

Ætiology.—The most frequent causes are accidents and wrecks on railroads, steamboats, violent concussions or shocks. Severe moral shock has the same effect; a man may be the innocent cause or the witness of a frightful accident, and, though not necessarily much affected at the time, may soon after develop a profound neurasthenia, usually with predominance of the brain symptoms.

Symptoms.—The neurotic condition may develop at once, or several days or a week may elapse before the subject is conscious of having suffered harm. Thus a train may be wrecked; a passenger who has escaped injury works heroically at the rescue of others, appearing unusually energetic and well; he returns to his home and business, evidently none the worse for his experience; but after a few days he is taken ill, remains in broken health for a long time, and eventually may be wholly disqualified for any kind of useful activity. The prodromal symptoms are those of general indisposition and physical weakness; these are followed by mental disquiet, irritability, failure of brain power, despondency, headache, often with ringing in the ears, insomnia and the entire train of symptoms described under neurasthenia. There are frequently hysterical symptoms of remarkable severity, closely resembling *petit mal*, even to loss of consciousness, while in other and rare cases there may be delirium and even mania; sometimes diabetes has occurred. These cases may partake of any one of the many eccentricities of neurasthenia or hysteria.

Exceptionally serious organic disease of the brain or of the spine may result from a concussion which gave no external evidence of an injury received. In such cases the symptoms at first may be those of profound hysteria (sensory disturbances, paralysis, especially *monoplegia*, contractures without atrophy), but eventually symptoms will develop which indicate profound organic lesions (atrophy of the optic nerve, tremors, paresis, exaggerated reflexes, etc.). Our knowledge of the exact nature of the organic lesions, as the result of concussion, is very limited. Cases have been recorded of chronic *pachymeningitis*, of degeneration in the pyramidal tracts, of punctiform hæmorrhages in the brain or cord; extensive arterio-sclerosis of the vessels of the brain and cord has been observed in several cases, with degenerative changes in the brain substances. In all these, symptoms of neurasthenia and hysteria were pronounced in the early stage.

The diagnosis is of particular interest in view of the medico-legal aspect of these cases, usually connected with suits for damages against large corporations. The plaintiff is naturally, often justly, suspected of malingering or of wilfully exaggerating the severity of the harm received, and medical testi-

mony must decide the extent of the mischief actually done. It is to be remembered that the hysterical symptoms, though often in appearance the most serious, are in reality comparatively trivial, while the neurasthenic condition is much more grave. Especial pains must be taken to recognize indications of organic lesion of the brain or cord, since these are sure to increase continuously, with the certainty of prolonged and even complete disability from them. It must also be borne in mind that in the purely neurasthenic type the *course* of the affection is very slow, and that, while life is not endangered, the patient may be for years, and possibly for life, unfitted to hold a position involving responsibility or close application to work.

Treatment is that of neurasthenia, the Weir Mitchell treatment, i. e., absolute rest of mind and body for a long time, being indispensable to a permanent recovery. There is a strong tendency to relapse from any premature effort to assume the duties of business life.

CAISSON DISEASE OR DIVER'S PARALYSIS.

An affection found among divers and workers in caissons, produced by a too sudden return to the normal atmospheric pressure after prolonged subjection to a highly compressed atmosphere, which must always exceed the pressure of three atmospheres. Practically nothing positive is known of its pathology.

Symptoms.—Usually the symptoms begin within a short time, from half an hour to two hours, sometimes immediately, after return to the surface. In the mild form, there are intense pains about the knees, legs, and hands, occurring in paroxysms, sometimes with painful retching, vomiting and colic; dizziness and headache are often present. In the severer form this is soon followed by loss of motor power and sensation in the legs, either a paraplegia or a paralysis involving the trunk and arms; the excruciating pains continue even though anæsthesia may be complete. A cerebral type has been described, with intense pain in the head, dizziness, double vision, incoherent speech, delirium and loss of consciousness. In extreme cases the patient appears as though smitten with apoplexy and may rapidly drift into coma and death.

Recovery may be rapid; even severe paraplegia may pass off in a few days, while in other cases it may persist for months. In a large number of cases recovery is tedious and not always complete. Death occurs early from apoplexy, late from paralytic bedsores and cystitis.

Treatment.—Preventive treatment consists of care in gradually getting accustomed to work under high atmospheric pressure and in taking an abundance of time in returning to the surface; it is stated that at least five minutes should be allowed for each additional atmosphere of pressure; upon coming to the surface, the men should always rest for a short time. Immediate return to the caisson has been advised on the appearance of the first symptoms of the disease. During the attack inhalations of oxygen and the use of compressed air are recommended. For the relief of the intense pain, applications of hot water, rapidly renewed, are useful; morphia may be demanded. Other treatment is that of *myelitis*. See also “paraplegia.”

OCCUPATION NEUROSIS.

An affection consisting of involuntary spasmodic contractions of certain groups of muscles, interfering with or preventing the performance of the intended acts, resulting from the excessive use of such muscles in the pursuit of various callings. This condition is found in writers, pianists, violinists, tailors, telegraph operators, type-writers, professional dancers (muscles of the calves of the legs), and many others. That the affection is of central origin is indicated by the fact that in persons who have learned to use the left hand in writing, because of writer's cramp in the right, the left nearly always in a short time becomes involved in the same difficulty; furthermore, writer's cramp is in many cases the first indication of a neurasthenic state and may be brought on by anxiety and worry. Men of a nervous temperament are more frequently affected than women engaged in the same occupation.

Writer's Cramp is especially common in persons who use the little finger or the wrist as the pivot, and rarely, according to Gowers, affects those who write from the middle of the forearm or from the elbow or even shoulder. Copyists who work con-

tinuously and at a high rate of speed suffer from it oftener than persons who can give the muscles occasional rest.

Symptoms.—The onset is usually gradual. There is conscious difficulty in holding the pen and interference with accustomed freedom in executing the necessary movements. A sense of fatigue in the fingers and often in the forearm, with feeling of rigidity in the muscles, is frequent, demanding a certain amount of effort to keep the pen moving. Sometimes formication and numbness are felt. As the affection increases, pain in the arm is common, sometimes consisting merely of a painful sense of fatigue, at others neuralgic in character; this pain may gradually extend upward, and may be very severe in a spot between the shoulder-blades. The sense of stiffness or tonic rigidity in the muscles is marked, and may amount to positive resistance when trying to grasp the pen. Spasmodic contractions are frequent. At first they merely interfere with the regularity and clearness of the writing, producing irregular strokes toward one side or the other, up or down, but after a time they become more violent and jerk the pen away from the paper, or hold it as in a vise by sudden flexion of the fingers, or drop it unceremoniously by sudden extension of the fingers. These spasmodic contractions in aggravated cases may involve the entire arm. More rarely tremors occur, especially in the forefingers, but also, in severe cases, affecting the forearm and arm, so completely disfiguring the writing as to render it wholly illegible.

Exceptionally there is subacute neuritis with numbness and tingling in the fingers and pain over the nerves. Hyperæsthesia is sometimes present. Rarely flushing of the parts, with heat and venous engorgement, has been observed.

The diagnosis is easy, but care must be had to differentiate from cerebro-spinal disease (as progressive muscular atrophy).

The prognosis is not favorable, since resumption of the work usually brings on a relapse.

The treatment consists of absolute cessation of all attempts to use the pen. Massage, intelligently and perseveringly employed, is of the greatest benefit. The galvanic current is useful. Wood directs that a small positive pole be placed over the nerve trunks in the groove of the inside upper arm, letting the

hand rest on a large sponge electrode connected with the negative pole, a light current being used.

Persons who are obliged to write much should use a large penholder and a blunt-pointed pen, cultivating a free round hand. The first appearance of symptoms indicating writer's cramp should lead to the use of the type-writer.

MIGRAINE (Hemicrania; Megrin; Sick Headache).

A paroxysmal affection characterized by severe headache, nearly always unilateral, usually associated with sensory disturbances.

Ætiology.—The chief predisposing cause is an inherited neurotic tendency. The affection is sometimes handed down through several generations. A gouty and rheumatic bias has been observed. Many cases are due to reflex irritation, as from eye-strain, uterine and menstrual disorders in adults, and from affections of the nostrils and adenoid growths of the pharynx in children. Exciting causes are: powerful emotions, mental excitement, great bodily fatigue, as a long journey on the cars (eye-strain?), and indigestion, usually from errors in diet. Sick headache occurs much oftener in women than in men. It usually begins early in life, from the fifth to the tenth year, a first attack rarely occurring after the thirtieth year; it may recur with distressing regularity throughout life.

Symptoms.—The premonitory symptoms are chilliness, languor and mental confusion, excitement or depression. In many cases these are striking and remind one strongly of the aura of epilepsy. A majority of them are referred to the sense of vision. There may be transient hemianopia or scotoma; others present *hippus*, alternating contraction or dilatation of the pupil, on the affected side; still others see balls of fire or the so-called fortification-lines, often brilliantly colored. Vision is nearly always blurred. More rarely there are hallucinations of sight, as animals about the room. Hallucinations of smell (of osmic acid), of hearing (sounds as though a marine shell were placed to the ear) and of taste (sour, metallic taste) are less frequent. Again, numbness and tingling of tongue, face, and hands have been described, and very rarely transient motor and sensory aphasia. The *headache*, which soon follows, begins in and emanates from a clearly defined spot, near the supra-orbi-

tal foramen, more rarely in the eye-ball. It is cumulative, of a boring character, of intense severity and expansive, extending sometimes very rapidly, to the entire affected side of the head, into the neck, and often into the arms; occasionally it occupies the occiput. The suffering is intense, the patient lying utterly prostrated, unable to raise the head from the pillow, and usually enduring tortures from the slightest noise and light. Often the headache is accompanied with nausea, retching and vomiting, first of the contents of the stomach, then of bile and mucus. In many cases, when the stomach is full, vomiting affords relief, and it is not unusual to have an attack pass off in this manner, the patient, exhausted from the effort, falling asleep, and waking feeling well; in others the paroxysm comes to a close with copious emissions of limp, colorless urine.

There is usually pallor of the face, followed by flushing of the affected side, with slow pulse. There may be stiffness and hardness of the temporal artery on the affected side, like that of arterio-sclerosis, the existence of which has, in fact, been demonstrated (Thoma).

The duration of an attack is rarely less than a day; if severe, it may last two or three days. The paroxysms have a tendency to recur regularly at stated intervals or at any time when brought on by the special conditions which in the individual affected act as exciting cause. This may continue for many years, not infrequently for life. Often, however, the attacks cease at the climacteric period in women and at about fifty years of age in men.

Nothing positive is known of the pathology of migraine. Gowers calls it a "nerve-storm," and Osler, in carrying out this generally accepted figure of speech, suggests that the attack itself in that case is the "sensory equivalent of a true epileptic attack." This, indeed, seems to be the case, and not exceptionally migraine may in the same individual alternate with epilepsy, as with some other neurosis. Others teach that the early symptoms of migraine are due to constriction, the later symptoms to dilatation, of the blood-vessels.

Treatment.—Removal of the cause, whenever possible, should receive the first care. Hence the necessity of looking for errors of refraction and, in children, for such abnormal conditions of the nostrils and pharynx as may be at fault; their correction

may cure migraine. In both adults and children any measures which restrict the neurotic tendency by building up the system should be promptly adopted. Children especially may be saved much suffering if wisdom is exercised in the regulation of their every-day life, if they are not allowed to indulge largely in sweets and pastries, but are furnished plain, sensible, wholesome food, and are made to live an active life in the open air and to have long hours of sleep. To avoid overtaxing the eyes, children should not be permitted to pore too long over school books or stories. It is evidently a matter of common sense to avoid known causes of hemicrania. Adults usually are well aware of what is likely to bring on a paroxysm in their own case, and will not bring upon themselves severe suffering by some deliberate act on their part; in children, also, observation and experience will soon show what they must avoid.

During a paroxysm the patient needs, and will of his own accord demand, perfect quiet and, probably, rest in bed. Sometimes relief may be had by tightly bandaging the head or by drinking a cup of very hot strong black coffee. Some patients find alleviation from 10 to 20 drops of chloroform. The homœopathically indicated remedy often accomplishes a permanent cure and rarely fails to ameliorate the intensity of a paroxysm within a reasonable length of time.

ARGENTUM NITRICUM. Headaches usually begin in the morning. They are deep-seated, boring, screwing, pressive, in the temples, and extend into the face. Accompanied with dimness of vision, inclination to reel sideways, ringing in the ears, chilliness, thick white coating of the tongue, flatulent distension of the stomach, nausea and vomiting. Relief is obtained from bandaging the head tightly; from eating; from taking a glass of wine. Sometimes the pain seems pressing from within outward, as though the bones in the aching region were pressed apart. When the gastric symptoms are at their worst, there is excessive faintness, trembling of the whole body, profuse cold sweat, followed by vomiting and, at least temporary, relief.—**IRIS.** One of the best remedies when the attacks occur at short intervals and are connected with severe gastric symptoms. The pain is oftenest in the right side, over the eye, boring, sometimes hammering or clawing. There is much nausea and repeated vomiting, often of sour, bitter, watery substance,

sometimes of clear bile. The patient is "bilious" a good portion of the time and is habitually constipated. Blurred vision.—IGNATIA. Headache from emotional, depressing influences, in character resembling *clavus hystericus*. Sometimes occipital; better from inclining the head forward, from stooping. Hysterical disposition.—SANGUINARIA. Attack begins on the right side, in the forehead and vertex, or in the occiput, and from there extends to the right supra-orbital region. There is frequently a copious discharge of water from the right eye while the attack lasts. Relief from sleep; the paroxysm passes away with free flow of limpid urine.—GLONOINE. Strong pulsations in the head; every beat of the heart feels like the blow of a hammer in the painful region of the head. Surging, wave-like sensation in the brain; crushing pain. The face looks purplish and bloated; he is fairly crazed with the intensity of the pain. The head feels enlarged. Ringing in the ears; fluttering and violent beating of the heart. Somewhat better from steady, hard pressure.—BELLADONNA (ATROPINE). Occasionally useful in young, plethoric people, with right-sided hemicrania and symptoms of active cerebral congestion which do not, however, reach the intensity which calls for GLONOINE. "Throbbing of carotid arteries." Sometimes great pallor of the face. Worse from lying down, from motion, from a jar, from touch; better from pressure and from bending the head backward.—NUX VOMICA. The pain is of a neuralgic type, involving the eye and face, and accompanied with numbness in the affected parts, watering of eyes and nose, and great sensitiveness of the eyes to light. Pressive, dull boring pain over the left eye. With vertigo, characteristic gastric symptoms and other general indications. Pain in the occiput, heavy, grinding; almost drives him crazy.—SPIGELIA. Neuralgic headache, generally beginning at one point and radiating in different directions; pains burning, jerking and tearing, sometimes ending with vomiting, sometimes beginning in the morning and ending in the evening, at times a feeling as if the head were opening. (T. F. Allen.) Worse from stooping, motion, concussion, noise and during stool. Tendency to recur at regular hours.—CANNABIS INDICA. Sensation as if the head were opening and shutting. Pain agonizing. Great excitement; delirium; unconsciousness. Excessive prostration. Face pale, head cool. Very strongly rec-

ommended by Hale. Given by the dominant school as a favorite routine prescription in doses sufficiently large to merely fall short of producing physiological effects.—STANNUM. Patient gentle, hypochondriac, tearful. Pains get worse and better gradually; cramp-like, as if constricted by a band; as if forced asunder. Consult also ARSENICUM, AURUM MET., CACTUS, COFFEA, GELSEMIUM, PHOSPHORUS, PULSATILLA, SEPIA, SILICA, SULPHUR, THUJA, VERATRUM, ZINCUM.

For the purpose of obtaining immediate relief, the coal-tar preparations are commonly used by practitioners. I am prejudiced against them on account of their depressing influence and lack of curative power. Phenacetine is usually given in doses of ten grains. Bartlett recommends a mixture of acetanilide and caffeine in proportion of three and a-half grains of the former to one-half grain of the latter, giving from four to eight grains of the mixture as the initial dose; he repeats in an hour, if the drug is borne well.

NEURALGIA.

A painful affection of the nerves, felt in the course or in the distribution of one or more special nerve trunks or branches, occurring in paroxysms of intense pain, and resulting from disturbance at the central or peripheral extremities of the nerves or from a neuritis in their course.

Ætiology.—Neuralgia is an affection of middle life, more frequent in women than in men, and rare in children. It prevails in persons of neuropathic predisposition, and here, as in other neuroses, debility and anæmia are commonly associated with it. Cold, i. e., draughts, wind and wet, are responsible for many cases. It sometimes occurs in the early stage of certain acute fevers (typhoid, small-pox) and may be an expression of the malarial cachexia.

Neuralgia is also a feature of poisoning with lead, copper, mercury, sometimes alcohol and nicotine, and may complicate gout, rheumatism and diabetes. Reflex neuralgia, so-called, may arise from irritation without the nerves, as in the sexual organs or, in case of neuralgia of the fifth nerve, from caries of the teeth.

Symptoms.—Usually the paroxysm of pain is preceded by coldness, uneasiness, numbness and tingling of the part. The

pain is very severe and boring, darting or stabbing in character; it may be continuous; more often periods of acute exacerbation are noticed. It commonly follows the course of the affected nerve, but may radiate into neighboring parts. There is usually hyperæsthesia of the skin over the affected parts, with definite points which are very painful and sensitive to light pressure (Valleix's *points douloureux*); these may sometimes be found during the interval between the paroxysms, and then aid in the diagnosis. There may be motor-irritation, but paralysis is never present in uncomplicated cases. The face, especially in the trigeminal form of neuralgia, is pale, sometimes red, hot and burning. Of trophic disturbances the most important are herpes, urticaria, pigmentation of the skin, rarely falling out or whitening of the hair. Usually the general health and nutrition are not affected, but in particularly severe cases the suffering is so intense that the patient becomes emaciated and depressed; cases of mental aberration and suicide, as the result of the intolerable pain endured in incurable cases, are not infrequent.

INDIVIDUAL FORMS OF NEURALGIA.

Neuralgia of the Trigemini. (Trifacial neuralgia, prosopalgia; tic douloureux). One of the common and very important forms of neuralgia, due, in addition to general causes, to irritation from caries of the teeth and to affection of the nasal and frontal cavities and of the middle ear. Disease of the cranial bones and periosteum, chronic malarial poisoning and, possibly, excessive use of the eyes may cause this affection. The paroxysms are nearly always intense, sometimes unbearable; the pain is usually worst in the branch especially affected, but may involve all the branches of the trifacial and radiate into the occiput, neck and shoulders. Here, if long-continued, falling out and blanching of the hair, with other pronounced trophic changes, are comparatively frequent. In neuralgia of the *ophthalmic* branch the pain is supra-orbital or frontal. There is usually pain to pressure on the point of exit of the nerve at the supra-orbital foramen and at the point of entrance into the muscle; also pain, sometimes, at the occipital protuberance and in the upper cervical spine. The conjunctiva may be injected; copious lachrymation is not uncommon. Neuralgia of the

second branch (supra-maxillary neuralgia) presents a painful point where the nerve leaves the infra-orbital foramen; others may be detected on the zygoma and upper lip. The pain is worst along the upper teeth. In neuralgia of the *third branch* (infra-maxillary neuralgia) the chief painful point is at the mental foramen. The pain involves the ear, lower jaw, and teeth, rendering speaking and masticating painful. There may be copious salivation.

The prognosis is good in recent cases of which the cause can be removed; in old chronic cases and in those where the cause is beyond reach the prognosis is not encouraging.

Cervico-occipital neuralgia involves the posterior branches of the first four cervical nerves. Painful points are usually found about midway between the mastoid process and the first cervical vertebra. It is either the result of a cold or caused by caries or a new growth. Pain is severe. The neuralgia is nearly always bilateral, though worse on one side than on the other. Falling-out of the hair is frequent.

Cervico-brachial neuralgia involves the sensory nerves of the brachial plexus. The radial and ulnar nerves are those usually affected. The causes are wounds, contusions of the nerves, cicatrices, foreign bodies, rheumatism of joints. There may be an ascending neuritis, the result of crushing of the fingers, the neuralgia then involving a considerable part of the arm. Here amputation-neuralgia, from neuromata on the cut end of nerves, plays an important part. Other cases are due to pressure on the brachials from a tumor in the axilla or aneurism of the aorta. The pain is rarely localized, but follows the course of the nerve throughout its length. There may be painful points over the brachial plexus, over the radial on the external surface of the upper arm, over the ulnar at the elbow, over the median at the inner border of the biceps, and over the point where the cutaneous nerves emerge from the fasciæ. The most important trophic disturbances are "glossy fingers," a shiny atrophic condition of the skin of the fingers, and sometimes noticeable atrophy of the entire arm.

Neuralgia of the phrenic nerve gives rise to pain in the lower thorax, on a line with the insertion of the diaphragm. Any sudden depression of the diaphragm (coughing or deep inspiration) is painful. It is a rare form, sometimes seen in pleurisy and pericarditis.

Intercostal neuralgia may occur idiopathically in hysterical and anæmic persons, especially in women, or in connection with caries, aneurism, pleuritis, or disease of the cord (tabes dorsalis). Usually the intercostals from the fifth to the ninth are affected, and more often those on the left side. Painful points are formed, one near the vertebral column, one at the middle of the nerve, and one near the sternum or over the rectus abdominalis. The pain is constant and much aggravated from movement. *Herpes zoster* or *zona* is seen in severe cases, probably due to neuritis of one or more of the intercostal nerves. The pain precedes the eruption, but the eruption may occur without pain. The neuralgia continues indefinitely after the eruption has disappeared, and may be so severe as to make life a burden. The "pearly" eruption of this condition was thought to be of trophic origin; Dubber's anatomical studies lead him to believe that they may arise from an extension of the inflammation from the terminal nerve branches to the skin. *Mastodynia* (neuralgia of the mammary gland), which in reality belongs here, is a painful and obstinate form usually occurring in women, after the age of puberty. It appears to hold some relation to anæmia and hysteria, and is at times the result of traumatism. There is severe continuous or paroxysmal pain in the breast, in which occasionally little nodules may be felt, suggesting the possibility of carcinoma. These cases frequently are very stubborn and resist treatment for a long time. Bandaging the breast and the local application of heat (warm packs) may give relief; not infrequently recourse must be had to surgical treatment, but without positive assurance of a cure even then.

Lumbar neuralgia is comparatively rare. It is usually located in the ilio-scrotal branch of the lumbar plexus, and is characterized by pain along the crest of the ilium, inguinal canal, spermatic cord, scrotum or labium majus. Sir Astley Cooper's "irritable testis" probably belongs here, an affection in which intense pain is felt in the spermatic cord and testicles, usually with extreme hyperæsthesia of the parts, not rarely calling for castration.

Coccydinia consists of severe pain in the region of the coccyx. It occurs much oftener in women than in men, is exaggerated by sitting, walking, and at stool, and may necessitate amputa-

tion of the coccyx, a measure which does not always afford relief.

Sciatica (sciatic neuralgia) may be a functional neurosis or a neuritis of the sciatic nerve or of its cords of origin. It is peculiarly a disease of adult males. Exposure to cold and wet, with overexertion, are its most frequent causes. Often there is a history of gout or rheumatism. It may be caused by compression of the nerves by tumors within the pelvis, lymphadenomata, or the foetal head during labor. Long-continued pressure by sitting in an uncomfortable position sometimes causes sciatica. Lesions of the hip-joint may induce a secondary form of the affection. In the operation of stretching the nerve for the cure of sciatic neuralgia it has been found red and swollen, in a condition of neuritis.

Symptoms.—The onset is usually gradual. There is pain in the posterior thigh, felt most in certain positions and made worse from exertion, often much aggravated from turning in bed. Some fever may be present. The pain soon increases, sometimes rapidly, and involves the whole leg, radiating over the entire area of the distribution of the nerve. The pain is variously described as gnawing, boring, aching, or darting and lancinating; it may be continuous, but often there are paroxysms of intense aggravation which are almost unendurable. The patient suffers most at night. Exquisitely sensitive spots are readily found at the notch or in the middle of the thigh. Walking is difficult; the knee is bent; at every step the patient feels his way, resting the foot on the toes to keep at a minimum the tension on the nerve. In some cases there may be sensory disturbances, as paræsthesia, hyperæsthesia or moderate anæsthesia. There may also be motory irritation, tremors, twitching and clonic spasms. In one case recently under my observation clonic spasms were of frequent occurrence, and at one time persevered for an hour and a half, causing most excruciating suffering. If the case is unusually tedious, wasting of muscles may occur, but there is no reaction of degeneration. Exceptionally the neuritis may ascend and involve the spinal cord.

The duration of sciatica varies. The disease is obstinate and may continue for weeks and months. One nerve may recover, and the neuralgia then appear in the other; or relapses may take place, the case dragging on indefinitely, rendering the subject bed-ridden and helpless.

The diagnosis usually is not difficult. Affections of the hip-joint have no tenderness in the course of the nerve, and there is pain on moving the joint or upon pressure in the region of the trochanter. It must not be forgotten that sciatic pain occurs in the early stage of *tabes dorsalis*. Proper steps must be taken to determine if the *sciatica* is secondary to some affection of the pelvis or to disease of the spinal cord.

Neuralgia of the Nerves of the Feet.—The following forms are distinguished: "*Painful heel*" which renders walking difficult. *Plantar neuralgia*, with pain in the tips of the toes or ball of the great toe, with, often, numbness, tingling, hyperæsthesia, or sweating. It partakes of the nature of a neuritis, and occurs after typhoid fever and in caisson disease. *Metatarsalgia* affects the fourth metatarso-phalangeal articulation, usually of one foot only, is very painful, and nearly always demands an operation. It is thought to be the result of pinching the metatarsal nerve.

The Treatment of Neuralgia —Certain general facts underlie the treatment of all forms of neuralgia. Whatever tends to remove possible causes, and by building up the general health may enable the patient to resist an inherited tendency to neuralgia, may be considered in the light of prophylactic measures. Even after attacks of neuralgia have occurred, it is of the greatest possible importance to carefully look after the general health of the patient, for increased vigor may of itself prevent a return of the affection. To this end due observance of all the laws of wise living must be exacted; the habits of the patient must be considered and corrected where necessary; a life in the open air, properly regulated gymnastics, sea-bathing or such bathing as may be available, and a change of climate, preferably some attractive spot in a moderately elevated mountain-region, are of inestimable value and usually quite sufficient to cure light or recent cases. Causes of reflex irritation must be promptly removed. The removal of tumors, excision of cicatricial tissue, or so small an operation as the extraction of a decayed tooth may yield the most satisfactory results. Constitutional diseases or taints must be corrected; gout, rheumatism, syphilis, anæmia, a neuropathic tendency, any of these modified or cured, will change the entire aspect of the case. Thus, the proper regulation of the diet of a gouty person will

indirectly have a favorable effect upon the neuralgia from which he suffers. The value of rest, especially in cases where a considerable area is affected, cannot easily be overestimated. In the treatment of sciatica, for instance, confinement of the affected leg in a long, well-padded splint, gives to the limb a degree of comfort which it cannot have otherwise, and may materially lessen the duration of the attack; in chronic cases it is almost indispensable. Warm baths and the continued use of hot poultices are very beneficial. When within reach, natural mud baths should be taken. They are found in nearly all parts of the country, and even a short residence at one of them may in a surprisingly short time produce quite startling results. I know patients who are chronic sufferers from neuralgia who, by occasional resort to mud-baths, manage to get along very comfortably.

There is a strong temptation in the treatment of these cases to resort to the use of opium, and it cannot be denied that at times the intense suffering of the patient justifies its use. All authorities, however, without regard to special therapeutic preferences, insist upon the danger which in all these cases attends the use of morphia. It requires more good sense and courage than most patients possess to bear severe pain rather than run the risk of permanent drug effects; hence the physician must be both judicious and firm. If the use of morphine becomes unavoidable, the physician must administer it himself and must never allow the drug to be within the reach of the patient so he can take it when he pleases.

Alcoholic stimulants at times seem beneficial; but they also must be used cautiously; in some cases their immediate effects are not good; in others their habitual use would only prove mischievous.

Of local applications, counter-irritation and heat in some form may prove helpful in mild cases; hot cloths, frequently changed, often afford relief even in so severe a form as sciatica. Chloroform-liniment and oleates of morphia, atropia, or belladonna may also prove useful. The thermo-cautery has rendered good service in the chronic forms of neuralgia and in zona.

Electricity is beyond doubt of great value in some cases, although its employment offers many perplexing questions which

the highest authorities have not yet solved. Struempell recommends the following forms of application: 1. Stable action of the anode of a constant current on the affected nerve trunk over as great an extent as possible, especially on any painful point. The current must be increased gradually up to medium strength; there should be no great variations in the current or interruptions of it, and the sittings must be daily, occupying from three to six minutes. 2. In neuralgia of the larger nerves we should use a stable descending (sometimes ascending) constant current, in which the anode is placed on the most central point of the nerve trunk available, or on the vertebral column, and the cathode on different peripheral points. 3. The faradic current also frequently acts very well. We faradize the nerve either with a moderately strong "increasing" current, or we apply the wire brush to the skin over the affected nerves. The latter method is very painful, but is often attended with excellent results.

In *brachial* neuralgia the descending galvanic current should be passed along the affected nerves. In *phrenic* neuralgia the galvanic current should be used, placing one pole just outside the lower part of the clavicular portion of the sterno-cleido-mastoid, the other at the epigastrium. In *intercostal* neuralgia use the faradic or the constant current; if the latter, place the cathode on the vertebral column, the anode on the lateral and anterior painful points, using a reasonably strong stable current. In *sciatic* neuralgia, especially when there is muscular wasting, use the galvanic current, placing a flat electrode over the sciatic notch and using a smaller one along the course of the nerve. Struempell recommends the faradic current, with wire brush.

Other local applications in neuralgia are the hot iron, thermocautery, blisters and, particularly in sciatic neuralgia, the injection into the nerve of distilled water, sometimes of chloroform. It has been found that the injection of pure water may afford as prompt relief from pain as though it contained morphia. A puncture may be followed by improvement; the needle should be thrust deeply into the most painful spot to the depth of two inches, and left there for fifteen or twenty minutes.

Nerve-stretching and excision of the nerve are measures of last resort in cases which have resisted all other methods of

treatment; of the two, the more radical operation has yielded the better results; in many cases, however, there has been recurrence of the pain.

ACONITE must always be considered in recent cases or in cases resulting from cold, especially from exposure to a severe cold wind. The pain is acute, sticking, often accompanied with numbness; the patient is intolerant of pain and presents the anxious and excited tossing-about which belongs to the remedy. The forehead may be involved, the pain being drawing, tense, numb, or pulsating. Neuralgic *toothache*; of brachial plexus; *phrenic*; *sciatic*; all of recent origin, with heat and fever.—GELSEMIUM. Nearly always associated with paralytic weakness and numbness of the affected parts, sense of great fatigue, general exhaustion, mental irritability or utter indifference, chilliness. *Facial* neuralgia; face looks puffed, dusky; blurred vision; wants to be left to herself. Deep-seated pain in the muscles of the back, hips and legs. *Sciatica*; legs feel heavy as lead and very numb; utterly tired out; characteristic fever.—BELLADONNA. In recent cases. Acts best in plethoric young people; in cases characterized by sudden onset of the neuralgia and congestion. *Ciliary* neuralgia, with heat and throbbing in the eyes; *facial* neuralgia, chiefly on the right side; *sciatic* neuralgia. In all these the pains are throbbing and very severe. Paroxysms of pain, beginning lightly, increasing gradually until they reach a high degree of intensity, then stop suddenly to recur after a time. Great sensitiveness to touch or jar; sensitiveness to light and noise. Heat in the affected parts.—CIMICIFUGA. Very useful in persons of rheumatic disposition and in cases due to ovarian and uterine disease. *Facial* neuralgia, involving vertex and occiput, extending even into the neck and spine. *Ciliary* neuralgia, with photophobia and asthenopia, sensation as though the eyeball were enlarged. *Uterine* and *ovarian* neuralgia, with great tenderness, especially on the left side. *Phrenic* and *intercostal* neuralgia. Often the pains are lancinating or like electric shocks. Very nervous and apprehensive. Characteristic mental depression.—ARSENICUM. The chief remedy in cases of long standing, with general debility, anæmia, chronic malarial poisoning. The constitutional characteristics are present, especially the exhaustion arising from tedious morbid processes, including caries and other organic

disease. There is restlessness, anxiety and melancholia, often with utter despair, and possibly suicidal tendency from the actual suffering endured. The pains usually are "tearing," often burning. *Visceral* neuralgia may present these, and in their treatment ARSENIC is important. Of permanent service in old cases of *sciatica*. Long experience with ARSENIC has taught the old school to place upon it great reliance as one of the few medicines capable of producing positive effects.—CHINA, like ARSENIC, is particularly valuable in anæmic cases, but acts less profoundly. *Trifacial* neuralgia, about the eyes and supra-orbital region, worse from the slightest touch, often worse at night. Ringing in the ears. Great acuteness of hearing and smell, neuralgia of the second and third nerve. Spinal irritability. Excessive sensitiveness of the skin, with aggravations of the pain from slight draught and touch.—RHUS TOXICODENDRON. In "rheumatic" cases, from exposure to cold, wet, from overexertion. General muscular soreness, numbness and paralytic weakness and stiffness. Great mental and physical restlessness, with sense of chilliness. Of especial value in *sciatic* neuralgia, with the above symptoms, the muscular soreness being intense, so that the patient, in spite of the severe aggravation caused by motion, is constantly trying to obtain relief by a change of position. Motion, in such cases, may be followed by clonic spasms of the muscles of the affected leg.—SPIGELIA. Pains burning, jerking, tearing, very severe, radiating, worse from motion. *Ciliary, facial, intercostal* neuralgia; neuralgia of the bowels, *about the heart*, extending into the arms, with præcordial anguish.

The following are less frequently called for: ARNICA. Muscles feel sore and bruised; chilliness without fever; pain sharp, as from a nail or a knife; *intercostal* neuralgia, with soreness in the muscles of the chest; gouty tendency.—BRYONIA. Rheumatic cases; intercostal and sciatic form, with characteristic aggravation from motion, soreness from lying on the parts; lumbago.—CEDRON. Clock-like regularity of the paroxysms. *Trigeminal form*, involving the supra-orbital nerve and right side of the face; severe pain in the eyeball, radiating into nose and face, with profuse lachrymation. Malarial poisoning.—CHAMOMILLA. In sensitive women and children who are peevish, impatient, exceedingly intolerant of pain. The pains

are tearing, shooting, pulsating.—*CLEMATIS*. *Irritable testis*; urinary irritation; worse at night in the warmth of the bed. Eczematous eruptions.—*COFFEA*. Great nervous excitability and intolerance of pain. It seems as though the brain were torn to pieces; as if a nail were being driven into the head; he cannot endure the pain; toothache, relieved from holding ice-cold water in the mouth; gets worse again as the water gets warm. Great sensitiveness to external impressions; sleeplessness; irritability of the heart.—*COLOCYNTHIS*. Pain boring, sharp and cutting, relieved by pressure; much soreness in the affected parts; facial and sciatic neuralgia.—*IGNATIA*. Characteristic mental symptoms and hysterical condition. *Supra-orbital* pain, boring, in a small spot; as if a nail were being driven into the head. Neuralgia of the face, with weeping and emotional excitement. Copious emission of limpid urine.—*MERCURIUS*. Useful when there is caries of the bones; facial neuralgia, with tearing pains, from taking cold, worse at night.—*MEZEREUM*. Neuralgic headache, beginning in the occiput and extending over the whole brain, with tenderness in the scalp, the pain burning and boring, extending to eye and teeth, and even down to the shoulder. (T. F. Allen.) Ciliary neuralgia, pains radiating and shooting downward, with a sensation of coldness and soreness of the bone. Facial neuralgia, burning, boring, better for a short time from drawing-in cold air; neuralgia from decayed teeth. Intercostal neuralgia, especially after herpes or with eczema.—*NATRUM MURIATICUM*. *Trigeminal form*, on the right side, supra-orbital, with soreness, vertigo, faintness, relief on perspiring, worse at 10 A. M. Eczema of the scalp. Chlorosis. Malarial cachexia (neuralgia appears in place of a chill.) Constipation.—*NUX VOMICA*. Supra-orbital and ciliary neuralgia, with numbness of the parts and running of water from eyes and nose. Lumbago; the back feels bruised and lame. General soreness.—*PLATINA*. Facial neuralgia, with numbness of the malar bones or feeling as though the parts were being crushed in a vise. Hysterical condition.—*PLUMBUM*. Anæmia. Abdominal and rectal neuralgia; *visceral* neuralgia; neuralgia occurring in connection with lesion of the spinal cord, intensely painful.—*PULSATILLA*. Neuralgia of the face; infra-orbital; in the teeth. Pains jerking, erratic, paroxysmal; with chilliness; better in the open air and

from walking about. Characteristic mental symptoms.—**STANNUM.** Pain at first light, increases gradually, then gradually diminishes and disappears. Neuralgia of the face, bowels; intercostal.—**STAPHISAGRIA.** Sensation of a ball in the forehead or of a lump which cannot be shaken off. Easily angered. Moist eruptions. Neuralgia of the shoulder-joint and arms.—**SULPHUR.** In scrofulous persons, affected with skin-troubles, of lithæmic tendency; periodic neuralgia, caused by suppression of an eruption; neuralgia alternating with some form of eruption. Neuralgic headache, with sense of tightness and congestion in the head and heat on the top of the head. Facial neuralgia (right side), worse at night. Dryness and redness of the tongue. Characteristic constipation and constitutional symptoms.—**THUJA.** Neuralgia of the head and face, violent in character, as though a nail were being driven into the head, or stabbing, with excessive soreness of the parts. Always much worse at night. Sciatic neuralgia (left side), extremely painful and with great soreness, so he cannot lie on the affected side. Intermittent neuralgia. Sycosis.

SLEEP AND SOME OF ITS DISORDERS.

“Natural sleep is that condition of physiological repose in which the molecular movements of the brain are no longer fully and clearly projected upon the field of consciousness” (H. M. Lyman); in other words, sleep is a regularly recurring, physiological depression of the functional activity of the brain, during which the exhausted tissues of the body may recuperate. Unconsciousness is not necessarily sleep. H. C. Wood distinguishes as follows: *sleep* is that condition of unconsciousness in which the subject is readily aroused, and when aroused is easily kept awake by external stimulations or by his will-power; *stupor*, that condition in which the subject is aroused with great difficulty, and when left to himself relapses into unconsciousness; *coma*, that state in which it is impossible by external irritation to restore consciousness.

Sleep is preceded by a stage of weariness which is an expression of the failing energy of the brain; there is heaviness of body and mind, thoughts flow slowly and often with appreciable lack of clearness, the special senses are dulled, muscular fatigue is felt, the eyes are kept open with difficulty, and it re-

quires a strong effort of will to overcome evident indisposition to further activity. The *hypnagogic* state, the stage of transition from waking to sleeping, is characterized by a consciousness of approaching rest; the body settles into a position of comfortable relaxation, the eye-lids close, the special senses are lulled. There is at first an exaltation of the reflex energy of the spinal cord, as shown by the sudden muscular jerkings in persons who are exceedingly tired; soon this disappears. Of the special senses, that of hearing remains active longest, in part, probably, because the external portion of the organ of hearing remains exposed to external stimuli. Soon the power of volition ceases, the logical association of ideas is temporarily lost, as are also the reasoning faculty and judgment, and the profound unconsciousness of natural sleep prevails. The average duration of sleep is about eight hours. It is "heaviest" during the first hour, reaching its maximum at the end of that time; during the next hour it diminishes rapidly; during the next five hours it constantly grows lighter, and vanishes at the expiration of about eight hours. Not only have scientific experiments (Kohlschuetter) proved this, but universal experience emphasizes the statement that the first sleep is heaviest and that wakefulness and dreams prevail during the early hours of morning.

During sleep the respiratory movements are reduced nearly one-fourth in frequency; they are more largely costal than diaphragmatic, and the act of inspiration is prolonged. The pulsations of the heart are reduced ten, or more, beats to the minute in adults, and from twelve to sixteen, or more, beats per minute in children. The temperature is lowered; an elevated temperature during sleep always indicates a pathological condition (Demme). The secretions are diminished, as shown in the comparative dryness of the eyes and mouth and the lessened pathological secretion of nasal catarrh; the amount of urine and other excrementitious matter is also much less during sleep than during waking hours. There is a lessening of the amount of oxygen absorbed and of carbonic acid gas exhaled. Whether, or not, the brain is ever to all intents and purposes fully asleep, without a single manifestation of intellectual activity, so that there is an absolutely dreamless sleep, is still an open question. Some high authorities affirm the contrary

and maintain that the brain is always on the alert; if this be so, the profound unconsciousness of sleep is unreal and arises simply from failure of memory.

The reduction of function is not uniform throughout; the functional activity of one organ may be wholly suspended, while elsewhere there is only partial cessation of function; actual increase beyond that which characterizes a state of waking may exist in some part of the body; hence the phenomena of dreams and somnambulism.

Insomnia or abnormal wakefulness may arise from irritation of the peripheral portion of the sensory apparatus or from central causes. To the former belong irritation of the organs of special sense which, in the milder and transient form, rarely cause more than passing wakefulness. Thus, the action of light upon the eye disturbs sleep. This is easily demonstrated by the inability of small infants to sleep when exposed to a bright light and the readiness with which adults will awaken from sound sleep when the room is suddenly illuminated by the reflection from a fire or when the light from a burglar's lantern suddenly falls upon their face. It is also well-known that in the far north during the long and bright polar night the natives darken their room during the hours of sleeping, and that travelers in that country find the lack of refreshing sleep due to the absence of diurnal darkness a source of serious suffering, even illness. Furthermore, all know that the occurrence of a total eclipse at any time of the day is a signal for the entire animal world to compose itself to sleep. The sense of hearing remains comparatively active during sleep, and often persons who are otherwise heavy sleepers are quickly roused by noise, especially when their name is spoken. *Per contra*, habitual noise, or noise long maintained, as the noise made by the running of street-cars, frequently induces sleep, and its abrupt cessation at once awakens the sleeper. The other senses are more quiescent and less easily disturbed. Heat, especially humid heat, is an enemy to sleep; witness the hot, exhausting, sleepless mid-summer nights, especially when a southern wind prevails. Cold, if extreme, produces stupor and death; if severe, it excites wakefulness; if pleasing, it favors sleep. All people naturally seek a moderately cool room for a sleeping chamber; they are, however, kept awake by cold feet. Pain is a very common cause of

insomnia. It may be due to affections of the nerves of common sensation or the result of some disturbance in the sympathetic nervous system. To the former belong such trifling causes as the stings of insects or the painful itching of an eczema or pruritus, and the intense suffering caused by a neuritis or the various forms of neuralgia. Colic, disturbances of the respiratory function, cardiac disorders, etc., are among the affections of the sympathetic nervous system which cause insomnia.

Sleeplessness due to a morbid state of the central nervous system frequently arises from cerebral hyperæmia, such as may result from prolonged and violent mental excitement, favored by habitual ill health, overwork, the excessive habitual use of alcohol and tobacco, or anything that tends to disturb the influence of the inhibitory centres over the lower ganglia of the brain. If such a condition is maintained for a considerable length of time, nutrition becomes impaired, rendering the brain anæmic and irritable, so that it quickly responds to slight impressions, remaining persistently wakeful and, if asleep, aroused by the most trivial causes. A differentiation between these two states—cerebral hyperæmia and cerebral anæmia—is exceedingly difficult. A similar effect may be produced by the action of certain chemical substances upon the brain. To these belong coffee and tea; alcohol, taken in large amounts, gives rise to a condition of irritable weakness of which insomnia is a prominent symptom. Irritating substances may also reach the brain through the blood from imperfect elimination (liver, kidneys, intestines) or from the absorption of various poisons (lead, mercury, miasms, etc.). The wakefulness which so often forms a conspicuous feature of inflammatory diseases, degenerative changes, new-growths, etc., are the combined effects of cerebral hyperæmia, direct irritation, and pain.

Treatment of Insomnia.—Persistent wakefulness seriously interferes with the repair of the tissues of the body and leads to innutrition and premature decay. Danger of permanent ill effects is greatest in those cases in which no adequate cause can be found. If occurring in children, it frequently is the first indication of the approach of tubercular meningitis or of some of the acute infectious fevers; in adults it may be the precursor of some serious cerebral disorder, as insanity. The appearance

of persistent insomnia in the course of a protracted sickness must always be considered a threatening complication.

The following are the most important agents used in the treatment of insomnia: *Heat* establishes an equilibrium of the nervous system. Hot baths are preferable and equally grateful to children and adults. The temperature should not be too high, but rather such as to constitute the bath a source of physical comfort to the patient, who should remain in it not to exceed ten minutes. A foot-bath or a sponge-bath may be used as a substitute if a full tub-bath cannot be had. Turkish baths, with shower-bath and massage, are excellent. *Massage*, properly given, is exceedingly useful in the cases which arise from spinal irritation and severe nervous headaches. Most persons experience from it a sense of rest; in others it acts rather as an excitant. *Electricity* is useful in cerebraesthesia. Often the passage, daily, of a mild faradic current from the back of the neck or from the stomach to the feet, proves very quieting. *Food*. Very important in cases arising from exhaustion; it should be *hot*, nutritious, soluble, and slightly stimulating. Milk is especially valuable when heated, slightly salted and, if necessary, partly predigested. (Dissolve five grains of pancreatic extract in half a pint of warm water; add, with five grains of sodium carbonate, to one pint of milk; put into a bottle, and immerse for half an hour in a jug of hot water.—Lyman.) Koumyss is nourishing and a favorite with dyspeptics. Egg-nogg is usually relished and its effects are desirable. Meat-juices may be taken in hot water or hot broth; they are stimulants rather than food. Neurasthenics who suffer from insomnia should avoid any exertion or excitement during the latter part of the day, should not take tea or coffee at noon or night, should eat a light evening meal, and upon retiring drink a pint of hot milk. *Cold sitz-baths* are sedative; the water should be of a temperature ranging from 90° to 60° F., the temperature being gradually reduced to 60° after the patient has entered the bath; one or two baths daily should be taken, from five to thirty minutes in duration. *Alcohol* is indicated when there is great bodily exhaustion, with cardiac weakness, muscular wasting and nervous irritability, a condition which is occasionally seen in the late stage of infectious fevers. It must be used with caution, since at times the effects are undesirable.

Often it acts well in case of extreme exhaustion from severe pain. An ounce of brandy should be given in egg and milk. If prescribed in delirium tremens, it is well to add tincture of capsicum. In cases of old people, with feeble digestion, suffering from wakefulness, a hot toddy before bed-time is grateful and appropriate. Under no circumstances must enough alcohol be given to produce the slightest symptom of intoxication.

Hypnotics.—No other class of drugs is so constantly abused by medical men who are ever ready to humor the whims of a patient, regardless of their real interests; in cases where their employment is based upon actual necessity, they prove an inestimable blessing. PARALDEHYDE, a substance which is exceedingly disagreeable to the taste, in doses of 45 to 160 grains, is one of the most reliable hypnotics when insomnia arises from cerebral hyperæmia, not from pain. It neither causes primary excitement nor cardiac depression. Yvon gives the following formula: Paraldehyde, gr. 20.00; spirits, 100.0; simple syrup, 75.0; tinct. of vanilla, 5.0. Of this mixture each ounce contains forty-five grains of paraldehyde. Dissolve this still further in sweetened water or beer to suit the taste.—CHLORAL HYDRATE is especially adapted to cases of insomnia resulting from exhaustion of the nerve centres; hence its usefulness in the wakefulness which follows excessive and prolonged mental effort, in mania (puerperal) and in delirium tremens. From 20 to 30 grains may be given in water, preferably peppermint water, to hide the taste—, to be followed in an hour by 20 grs. more, if necessary. If the stomach is intolerant of it, a drachm of chloral may be suspended with white-of-egg and a few ounces of milk and administered in the form of an enema. Chloral, if continued long, is a powerful depressant; hence it must be used with care.—OPIUM. When insomnia is due to pain, morphia, especially the sulphate of morphia, is indicated; the addition of atropia (gr. $\frac{1}{120}$ to $\frac{1}{60}$ to every one-quarter grain of morphia) renders it less dangerous and at the same time more effective. It acts quickest and best used hypodermically, thrown into the loose areolar tissue beneath the skin, preferably at the outer aspect of the arm, care being taken to avoid blood-vessels. If for any reason it cannot be given hypodermically, it may be administered per rectum, in solution or suppository. The rectum should first be thoroughly washed

out with warm water. The dose is slightly larger than when given by the mouth. In some cases CODEINE acts nicely; it is used in doses twice as large as those of morphia.—BROMIDES. In insomnia from overexcitement, worry, excessive fatigue, excessive sexual excitement, hysteria, mania. The following are commonly used: lithium bromide, 20 grs. every one or two hours, until sleep occurs; sodium bromide, 30 to 40 grs. every two hours; potassium bromide, 30 to 40 grs. every two hours; calcium bromide, 20 grains every one to two hours. Some practitioners are in the habit of prescribing hydrobromic acid, 25 grains, largely diluted in sugar water; its very disagreeable taste renders it objectionable to many persons. Occasionally bromides excite rather than quiet the patient; if so, morphine and alcoholic stimulants are indicated.—Other drugs occasionally prescribed for their physiological effects are: DIGITALIS, when there is enfeeblement of the heart. VALERIAN, when there is great hysterical excitement (elixir of valerianate of ammonia when insomnia is caused by pain or great nervous exhaustion). CANNABIS INDICA, when the wakefulness is due to pruritus or ungratified sexual desire. AMYL NITRITE, inhaled, when insomnia is caused by insufficient blood supply in the brain, as in case of aortic obstruction. HYOSCYAMUS, in children. HOPS, best in form of a good beer, is often excellent in sleeplessness from overwork; it should be drunk just before going to bed.

The treatment of insomnia as a feature of special disease is considered under the treatment of such affections. It may be added that in the sleeplessness of children opium must be used with extreme care; wakefulness in them often depends upon hunger, overeating or earache; or it may be a symptom of the early stage of an acute disease, or due to ill temper; these causes, discovered, will determine the treatment. In old age sleep is very essential, but wakefulness is a feature of many disorders of old age, and if there is marked insomnia, attention to the primary cause often proves the only intelligent way of meeting it. In fact, it is to be remembered that hypnotics are in reality make-shifts, and not, like the duly indicated remedy, capable of doing permanent and curative work.

Narcolepsy is a neurosis characterized by an overwhelming desire to sleep, of short duration, and occurring at irregular

intervals. Attempts to classify the cases observed are not successful or of practical use. Morbid sleep may end in death.

Somnambulism is a condition of sleep and unconsciousness in which the subject performs acts which seem to involve the exercise of consciousness and volition; in other words, it is a dream carried into action. The attacks occur in persons of a neurotic temperament, and it is probable that the neurotic tendency is really the determining factor in those cases which appear to result from injury or exhausting disease. Unlike dreams, which are most frequent during the early hours of morning, somnambulism occurs during the early part of the night, when sleep is most profound; this undoubtedly explains why the memory takes no cognizance whatever of the occurrence. The most important forms are: *Somnambolic lethargy*, a condition which outwardly resembles deep sleep; lasting from hours to weeks, even months, with complete unconsciousness throughout its course. *Somnambolic lethargy* may alternate with lucid lethargy, in which the patient is conscious of things which occur in her immediate neighborhood. *Lucid lethargy* may constitute one of the striking features of hystero-epilepsy. *Somnambolic dreams* are more common, and differ from the ordinary dreams in that they expend themselves upon the organs of external expression, hence are acted out; but they are not remembered. The "night-terrors" of children belong here. Acts of violence are sometimes done in this state, especially in very heavy sleepers who are aroused with difficulty; thus a man may fancy that he hears a noise, which he connects with burglars; he grasps a pistol and begins firing, possibly with fatal results to some other person in the room; when fully awakened, he remembers nothing of what has happened. In other cases the somnambulist merely gets out of bed, walks about as though perfectly conscious of his acts, often performing startling feats, for instance in climbing, or engages in any of the common acts of daily life, as writing, sewing, studying, playing on musical instruments, etc. The eyes may be closed while he is evidently in full possession of vision; or, if open, they are impassive, without expression, not sensible to common irritation, as from a bright light; sometimes he may be induced by a word of command to return to his bed where he quietly goes to sleep; or he may resist, but after a time obeys and retires.

The tactile and muscular senses are usually much exalted, hence the somnambulist may accomplish feats which in the waking state he would not undertake. Exceptionally, a dim remembrance, like a dream, exists of what has occurred; or the events of one somnambulatory paroxysm are remembered during a subsequent attack, as in the case reported by Macario, where a young girl had been violated during somnambulatory sleep and gave her mother the particulars during a subsequent attack. Moral perversions and insanity may accompany or follow such states. "The disturbance which these functional perversions of the nervous system bring into the course of life extends not only to the organs of sense, and to intellectual actions properly so-called, but it also sometimes awakens some instinctive excitation which surrenders the individual without any defense, and destitute of rational discernment, to the most deplorable impulses. He acts with the semblance of a freedom which he does not possess; he seems to prepare and combine certain actions in the light of conscious volition, when he is in reality only a blind instrument, obedient to the irresistible mandates of an unconscious impulse." (Lyman from Mesnet.) *Somnambulatory life* is a rare condition in which the subject appears like any other person, seemingly in the full possession of all his faculties, but has periods during which he lives an existence wholly distinct from his normal life, these states being divided from each other by a more or less complete break in the chain of memory. To this class belong the cases of individuals who get lost and are found at great distances from home or who return home, after having traveled over an extensive territory, having done business with experienced men who saw nothing abnormal in their appearance or actions, who in every way behaved like persons who knew what they were about, and yet remember absolutely nothing of what occurred during the entire period. A case is related by Macnish of a young lady who, without any warning, fell into a long and profound sleep; when she awakened from the sleep it was found that she had lost every trace of acquired knowledge; it had become necessary for her to learn everything over again, including spelling, reading, writing and calculating; gradually she became acquainted with the persons and objects around, "like a being for the first time brought into the world." After a few months she had a second

fit of somnolency. On rousing from it, she found herself restored to the state in which she was before the first paroxysm, but ignorant of everything that had befallen her afterward. For more than four years she passed periodically from one state to the other, always after a long and sound sleep, and each state characterized by a distinct existence of its own. The *hypnotic* state is somnambulism artificially produced.

ORGANIC DISEASES OF THE BRAIN.

AFFECTIONS OF THE MENINGES.

PACHYMENINGITIS.

Pachymeningitis or inflammation of the dura mater occurs in the following forms: *Pachymeningitis externa*, an inflammation of the external layer of the dura mater; it usually results from an injury (fracture of the skull) or from extension of inflammatory action, as in caries of the bones (syphilis, disease of the middle ear), more rarely from septic infection. Large amounts of pus may be present, giving rise to pressure upon the brain, headache, delirium, convulsions, coma, pressure-palsies. The symptoms usually are vague and may consist of headache only. *Pachymeningitis interna* nearly always results from sepsis. *Hæmorrhagic pachymeningitis* (hæmatoma of the dura mater) is characterized by the existence of superimposed layers of an exceedingly delicate structure which is rich in blood-vessels, with tendency to rupture and the formation of circumscribed sanguineous cysts. It is frequently found with atrophy of the convolutions. It occurs as the result of traumatism, alcoholism, syphilis, sunstroke, specific fevers, anæmia, etc. It is comparatively common in lunatics. The *symptoms* usually are vague, the patient complaining chiefly of headache. When, as the result of the hæmatoma, there is localized pressure upon the brain, there may be impairment of intellect, early contraction and, later, irregularity of the pupils, aphasic symptoms, irregular exacerbations and remissions of temperature, choked disk, convulsions, and gradual paralysis of motion and sensation. Recurring hæmorrhages are not infrequent and may

be followed by periodical headache, short periods of unconsciousness, transient paralysis, convulsive seizures, and even death when the bleeding is extensive. Paralysis may be bilateral (hæmatoma at the vertex and crossing the sagittal suture).

The diagnosis of pachymeningitis is obscure. According to Ranney, this affection may be suspected when symptoms of gradual cerebral compression follow injuries to the skull, necrosis of the cranial bones or otitis media, or when in cases resembling meningitis or cerebral softening there is bilateral paralysis, contraction of the pupils, localized headache, transient and recurring attacks of unconsciousness or paralysis, a slow pulse, strabismus, ptosis, and facial palsy.

The prognosis is always grave, and especially in hæmatoma and in cases associated with caries or otitis media. Chronic alcoholism renders the prognosis almost hopeless.

The treatment in the suppurative cases consists of evacuation of the pus by means of the trephine whenever its presence can be determined and its situation localized. In the non-suppurative cases the treatment must be directed to the primary cause; it embraces perfect quiet, a nutritious diet, abstinence from alcoholic stimulants, and the exhibition of the symptomatically indicated remedy.

LEPTOMENINGITIS.

An inflammation of the pia mater and arachnoid, with purulent or sero-fibrinous exudation beneath the arachnoid. The forms recognized are: acute meningitis, acute tubercular meningitis, and chronic meningitis.

ACUTE MENINGITIS.

A non-tubercular acute inflammation of the pia mater and arachnoid.

Ætiology.—Acute meningitis is in reality a disease of early childhood, the greater number of cases occurring during the first and second years of life; but it is not infrequent between the sixteenth and forty-fifth year. In adults, it is seen about three times as often in males as in females. The disease may be primary, sporadic or epidemic; and is due to the same influences which cause cerebro-spinal meningitis. Nearly always it is sec-

ondary, commonly the result of extension from local disease of adjacent parts, especially disease of the cranial bones, caries of the petrous portion of the temporal bone, wounds of the scalp, and erysipelatous and phlegmonous inflammations of the scalp and face; the meningeal inflammation occurs as the result of direct extension or of infection through the blood. It may complicate acute infectious diseases (scarlet fever, typhoid fever, small-pox, etc.); this applies particularly to pneumonia. Septic processes even in remote organs may cause it; thus it is comparatively frequent in connection with ulcerative endocarditis. More rarely it complicates Bright's disease or gout. Its relation to rheumatism, sunstroke, or excessive mental application is not yet determined. Exceptionally it is of syphilitic origin.

Morbid Anatomy.—Intense localized or general hyperæmia, with great dryness and opacity of the meningeal membrane, is after a few days followed by an effusion, usually moderate in amount and containing cellular elements, on the arachnoid in its sac and infiltrating the pia mater; exceptionally the effusion is very copious, and may by pressure empty the surface capillaries and flatten the convolutions of the brain. Later pus may be found on the arachnoid, on the pia mater, around the vessels and in the sulci of the convolutions. The nerve-sheaths are bathed in semi-purulent matter; the nerve-trunks may become involved, eventually undergoing softening and disintegration; adhesion between the dura mater and arachnoid may take place. Invasion of the ventricles may occur, their orifices of communication being closed; the ventricles then become distended with serous or purulent fluid, and there may be an œdematous and softened condition of the underlying brain-substance. Gowers points out that great extension of the ventricles may be seen without inflammation, simply the result of occlusion of the orifices of communication. When inflammation is most active, the effusion is rarely limited to the ventricles, but may invade the cord and escape into the brain-space. Upon removal of the calvaria, the surface of the brain appears greenish from the exudation present; the meningeal vessels are engorged and lie as distinct red lines upon a greenish back-ground; the pia mater is thickened, reddened, opaque in spots, with spots of adhesion to the dura mater; creamy exudation is found in the fissures and sulci; the brain-surface is dotted with capillary

extravasations; cross-section through the white substance of the brain often shows puncta vasculosa, minute spots of extravasation. The affection is usually *bilateral* in septic cases, in cases associated with specific disease and in those of pneumonic origin; in the latter, the disease is commonly limited to the cortex; it is *unilateral* in cases arising from extension of local disease, as caries of the cranial bones or otitis, and may then be associated with thrombi of the sinuses or abscess. According to Fagge, the presence of subdural pus is nearly always proof of extension from without.

Symptoms.—The onset of the disease usually is sudden and its course rapid. It may begin with or without chill, in children nearly always with convulsions (strabismus), with intense pain in the head, sensitiveness to light and sounds, and paroxysms of violent exaggeration. There is fever with a temperature of 102° to 103° , sometimes higher, and a small, firm, tense pulse. The headache grows worse in spite of all attempts to relieve it; it is accompanied with vomiting without sickness at the stomach, constipation, and retraction of the abdomen. The face usually is pale in the early stage, with injection of the conjunctiva; sometimes it is flushed. The fever increases after a few days, and the so-called stage of *delirium* sets in. This may be maniacal, accompanied with hallucinations of sight and hearing, or, especially in older subjects, it may resemble the delirium of typhoid fever. Jactitations, general restlessness, excitability, gesticulations, twitchings of the facial muscles, and rolling of the eye-balls in the orbit are common accompaniments. There may be stiffness of the neck from contraction of the posterior muscles. There may be rarely, in adults, convulsions, hemiplegia and paraplegia. Embarrassment of respiration and deglutition indicate involvement of the medulla or of nerve trunks arising from it. Involvement of the cranial nerves manifests itself by squinting, ptosis, marked contraction, dilatation or inequality of the pupils, with disturbances of vision and hearing. The delirium gradually subsides, and the patient slowly drifts into an increasing stupor, with slow, irregular, intermitting pulse, oscillations and, later, dilatation of the pupils, grinding of teeth, picking at bed-clothes, and frequently facial paralysis. The urine or stool may be passed unconsciously or, there may be retention. The

temperature increases steadily (106° to 108°), with a sudden fall to subnormal a short time before death; the pulse becomes thread-like; there is Cheyne-Stokes respiration, clammy coldness of the surface of the body, and death occurs from heart failure, asphyxia, or pulmonary œdema.

The pulse in the beginning usually is rapid and tense, sometimes slow and irregular. Hensch's teaching that an intermittent pulse is characteristic of meningitis is not borne out by facts. Respiration is slow and labored, accompanied with cyanosis, and may suddenly stop in case the lesion is in the posterior fossa. The headache often is accompanied with great tenderness of the scalp, but this does not bear a fixed relation to the site of the meningeal inflammation save when the pain persists in a circumscribed area. The so-called *tache cérébrale* is not of diagnostic significance, though it is frequently noted. Rigidity of the muscles of the neck, with retraction of the head, is seen oftener when the base of the brain is involved than when the cortex is the seat of the inflammation. It occurs early and is of diagnostic value. Local spasms may occur here, as in tubercular meningitis, when the seat of the lesion is at the base. Vomiting of cerebral origin is present in nearly all cases; it is most characteristic of the early stage.

Subacute leptomeningitis differs in no essential from the form described; it is simply a milder form, running a more deliberate course.

Diagnosis.—The diagnosis of simple meningitis is beset with difficulties, since many of the most characteristic symptoms may be found in other morbid conditions when there is no meningeal lesion. Gowers points out that even the general brain-symptoms are of slight diagnostic value, save as they are considered in their relation to other symptoms. Thus "the significance of the headache depends on its intensity; of the delirium, on its existence with headache; of vomiting, on its causeless character and persistence; of general convulsions, on their association with other symptoms; of infrequency of pulse, on its combination with pyrexia that usually accelerates the heart." The cases arising from disease of the cranial bones, otitis, or pyæmic processes are not so likely to escape recognition; in others it may be impossible to differentiate from the *cerebral forms of fevers* (as typhoid), except as in menin-

gitis the involvement of nerves at the base, giving rise to optic neuritis and paresis, at once clears up the diagnosis. From the *tubercular* form it may be distinguished by the greater abruptness of its onset, the greater rapidity of its course, the possible presence of primary local disease, the absence of a tubercular family-history and of tubercular disease in some other part of the body, and, often, the absence of involvement at the base of the brain.

Prognosis.—Although it is claimed that occasionally cases of meningitis recover, the prognosis is very serious. It must be borne in mind that a mistake in diagnosis is easily made, and this fact has its bearing upon the prognosis in the individual case. The grave character of the affection imposes great caution in the treatment of diseases in which extension to the meninges is comparatively frequent; yet, in these cases, as in those of syphilitic origin, the outlook is slightly more encouraging than in others. Involvement of both the convexity and base of the brain leaves slight room for hope; the absence of a tangible cause is a bad sign: the development of stupor, with dilated pupils, paralysis and very high temperature, foreshadows a fatal termination.

Treatment.—Surgical measures should be adopted when, as in otitis media or in injuries to the skull, the primary local disease can be reached by such methods; if employed at all, they should be employed promptly and thoroughly, since they can accomplish very little after the meningeal lesion is fully established. Cases of syphilitic origin must have specific medication (mercury or potassium iodide). According to Ramskill (Reynolds' System of Medicine), freely indorsed by clinicians of the dominant school, the treatment of simple meningitis resolves itself into "three great remedial measures; first, blood letting; second, hard purging; third, application of cold water or ice to the head." The practical value of these "three great measures" is proved by the hopeless prognosis made by the same authorities.

Outside of medication, which will be discussed later, there is little that can be done for the patient. Nourishing and easily digested food should be given as conditions warrant. The head may be shaved and cool applications persistently applied, cloths wrung out of cool water being changed at brief inter-

vals. A good purge at the beginning cannot be considered objectionable, and often appears to have a directly beneficial effect.

TUBERCULAR MENINGITIS.

An acute meningitis due to the presence of the tubercle bacillus; it is also known as *Acute Hydrocephalus* and *Basilar Meningitis*.

Ætiology.—Tubercular meningitis is either a local manifestation of acute general tuberculosis or is secondary to tubercular disease elsewhere. Heredity is strongly pronounced. It is largely a disease of childhood, most frequent from the second to the fifth or sixth year of life; occasionally it is seen in adults, chiefly men, during the third and fourth decade of life. It occurs with considerable frequency among the children of the poor, especially in cities, who grow up in want and amidst insanitary surroundings. It may develop during convalescence from one of the infectious diseases of childhood, especially scarlet fever and measles; it may follow an injury (blow or fall on the head) or overwork.

Morbid Anatomy.—The deposit of miliary tubercles is in the perivascular lymph-spaces, where they appear as grayish-white granules near the vessels, sometimes compressing and even occluding them. In children that portion of the pia mater which covers the base of the cerebrum is alone affected, but in adults the membrane covering the convexity of the brain, the longitudinal fissure and the cerebellum may be involved. “The favorite nesting place of the affection is in that portion of the pia which extends over the olfactory, the optic and the third nerve, as well as the crura cerebri.” (Landon Carter Gray). Tubercles may be found in the brain-substance itself; their numbers do not determine the extent of the exudation present. Under the microscope they appear as grayish-white, semi-transparent bodies. Not infrequently they form by confluence little nodules of the size of a pea; sometimes they are found to have undergone granular or cheesy degeneration. The resulting inflammatory exudate consists of turbid serum or fibrino-purulent exudation, which is usually most copious in the Sylvian fissures and inter-peduncular space, but may cover the entire base of the brain and extend to the lateral surface of the hemispheres and to the under surface of the cerebellum and to the

spinal meninges. The pia mater is thick, lustreless, moist and easily torn. The ventricles, especially the lateral ventricles, usually are dilated and contain an effusion, commonly serous, rarely purulent; if the effusion is very great, the cerebral convolutions may become flattened and distorted. In some cases the spinal meninges are extensively involved, with copious exudation along the cord, while the exudation at the base of the brain is trifling. Evidence of general tuberculosis can nearly always be found by examination of other organs.

Symptoms.—In nearly all cases the onset of tubercular meningitis is gradual. There is failing health, either in connection with existing general tubercular disease or associated with some one of the exciting factors already enumerated. The symptoms are those of general indisposition, fretfulness, unwillingness to play, pallor and dull expression of the face, restless and broken sleep, poor appetite, and progressive emaciation of body and limbs.

After two or three weeks the first stage of the disease—frequently called the *stage of irritation*—sets in with headache, fever and vomiting, or with a convulsion. The headache is frontal, evidently somewhat paroxysmal, and appears to be intense, for the child, if old enough and strong enough to do so, quickly puts the hands to the head when coughing and utters a sharp, short, piercing cry (the “hydrocephalic cry”) as though hurt; pressure upon the fontanelle in a young child increases the pain in the head. The fever at first is not high, but it gradually increases, the temperature reaching 102° or 103°; the pulse is rapid, full, compressible, sometimes irregular.

Vomiting is projectile, without nausea, and has no relation to eating. The tongue is dry and coated, red at the tip and on the edges. The pupils usually are contracted. There is much muscular twitching, especially of the face, with sudden startings. The child seems drowsy and wants to sleep constantly, but the sleep is restless; the head is rolled from side to side or bored into the pillows; it cries out as though in pain and frequently jumps up as though in terror. There may be delirium.

After a period varying from seven to ten days, symptoms of depression set in, due to effusion at the base of the brain and into the ventricles (*stage of depression*). Vomiting has ceased. The child lies dull, listless, slightly delirious; occasionally it still

utters the hydrocephalic cry, and shows by the expression of the face that there is still severe pain in the head.

The bowels are constipated, the abdomen retracted and boat-shaped. The temperature usually is lower than during the first stage, and exceptionally may be nearly normal; the pulse also is less rapid, often quite slow and irregular. There is tonic rigidity of the muscles of the neck, so that the head is retracted and bores into the pillow; sometimes the muscles of the back are involved, even to opisthotonos; there is tenderness on the neck to pressure. General muscular excitement may be marked, and general convulsions are not infrequent. The pupils vary in size; usually they are dilated and respond reluctantly to light; there may be strabismus, sometimes optic neuritis. Respiration often is sighing; swallowing may be difficult; urine and fæces may be passed involuntarily. The tongue is brown and dry; the mouth, lips and tongue are covered with crusts; the fæcal discharges are slimy and offensive; the urine is scanty, high-colored, slightly albuminous, rich in chlorides and phosphates. A blotchy erythema may cover the chest and abdomen. "Tache cérébrale"—the quick appearance of a red line when the finger-nail is drawn rapidly across the skin—is easily produced, but is not of diagnostic importance.

The approach of the third stage (*stage of paralysis*) is marked by an increase in the severity of all the symptoms, a renewed rise of the temperature, and rapid, feeble, intermittent pulse, with gradually developing profound coma. There are general or partial convulsions and contractures of the muscles of the neck, back, and jaw, followed by permanent paralysis of some parts of the body. The latter may assume the form of a hemiplegia when there is involvement of the cortical branches of the middle cerebral artery or softening of the internal capsule; or there may be monoplegia, usually of the face. Jacksonian epilepsy has been noted in cases which have run a very protracted course. The pupils are dilated, and the eyeballs roll, so that the "white of the eye" shows excessively. There may be optic neuritis and paralysis of the ocular muscles. Toward the close the pulse becomes more and more "thready;" the temperature, which may have reached 105°, or more, during this stage falls to 93° or 94° (there often is an *antemortem* rise of temperature reaching 108° or 110°), and death occurs from asphyxia, convulsions, or heart failure.

The duration of the disease varies from ten to thirty days after the appearance of cerebral symptoms. The course is rapid when meningitis is a complication of general tuberculosis and when, in adults, the convexity of the brain is affected.

The diagnosis rests upon the history of the case, the character of the headache and vomiting, the constipation and shape of the abdomen in the second stage, stiffness and retraction of the neck, and ocular palsies. These symptoms readily distinguish it from typhoid fever and other affections which in some respects resemble it.

The prognosis is almost hopeless.

CHRONIC LEPTOMENINGITIS.

Chronic leptomeningitis may gradually develop from the acute or subacute form; it is found in connection with tubercles or gummata in limited regions of the meninges, and may result from traumatism, alcoholism, and sunstroke.

The symptoms resemble those of the acute type, save that they develop slowly, are much less violent, and run a chronic course. When due to tubercular masses or gummata, the symptoms are identical with those of cerebral tumor and may, if the irritation is in the motor region, assume the form of Jacksonian epilepsy. Cervical opisthotonos is found in many cases, often preceded by convulsions, pain in the head, vomiting and moderate fever, followed by the gradual development of symptoms which are characteristic of the acute form, including facial hemiplegia in case the ventricular orifices are occluded by lymph.

Therapeutics of Meningitis.—For the purpose of avoiding repetition, the measures which are most likely to be indicated in any of the forms of meningeal inflammation will be considered under this head.

Of the first importance are those profoundly acting remedies which exert a direct and favorable influence upon the dyscrasia which so often underlies the local manifestation. The temptation is to slight them in favor of remedies which present a greater intensity of action in the cerebral sphere; but abundant clinical experience has shown that the truly "constitutional" remedies are capable of accomplishing far-reaching results. Of these, *CALCAREA CARBONICA*, *SULPHUR* and the *IODIDES*, given

in highly attenuated form, are here the most important.—*CALCAREA CARBONICA* deserves the most serious consideration in a child of fair complexion, fat, flabby, sluggish, backward, easily perspiring, with habitually cold feet, deranged nutrition, enlarged glands, open fontanelles, prominence of the abdomen, characteristic indigestion, etc., even though the inexperienced prescriber may hesitate to stake the issue of so serious a case upon its action.—*SULPHUR* is of corresponding value in children whose skin is rough and covered with some sort of an eruption, or when sudden disappearance or suppression of an eruption antedates the meningeal disease. The mucous membrane of the mouth and at the orifices of the body is bright-red, sore, burning. There are present in such cases the well-known conditions which always suggest *SULPHUR*, as characteristic skin-symptoms, eye-troubles, catarrhal affections, portal congestion, habitual constipation (dry and irritable rectum), burning heat of head, hands, feet, and the determined opposition of the child to come in contact with water.—Of the iodides, *CALCAREA IODATA* and *ARSENICUM IODATUM* are the most useful, but they do not rival *CALCAREA* or *SULPHUR*. Of the two, *ARSEN. IOD.* has much more restlessness, a greater degree of prostration, nervous irritability and emaciation. It is especially adapted to scrawny children of dark complexion, with hard glandular enlargements, particularly about the neck.

Not infrequently in the early part of the stage of irritation *ACONITE*, *VERATRUM VIRIDE* and *GELSEMIUM* are indicated, though rarely for long; if they respond promptly, they will favorably affect the entire course of the disease. In *ACONITE* the pulse is hard, abrupt; in *GELSEMIUM* full, but rather soft; in *VERATRUM*, full, strong, voluminous. *ACONITE* has thirst, restless tossing about, and other well-known characteristics, and is particularly useful when the disease is connected with exposure to the sun.—*GELSEMIUM* has startings, jerking, trembling, paralytic weakness of muscles, great tenderness in the occipital region; the child lies in a half-stupor, with hot, moist skin, unwilling to be touched or moved. If moved or lifted from the pillow, the head and neck are drawn backward and the body stiffens. It sometimes is indicated during the paralytic stage.—*VERATRUM VIRIDE* is closely related to cases in which there is violent convulsive action from the beginning, with

cerebral hyperæmia, rapid and excited, powerful action of the heart, double vision, sensory irritation, great rigidity and bending backward of the neck and back.—**APIS MELLIFICA.** Of especial value after scarlet fever; it has yielded positive curative results. Stupor, interrupted by piercing, hydrocephalic cry; rolling of the head from side to side; boring of the head into the pillow; great restlessness and irritability at night; spasms of individual muscles; general convulsions; convulsions on one side, paralysis on the other. Face hot and livid; tongue red, later dry, hot, trembling, covered with crusts. No thirst.—**BELLADONNA.** In full-blooded persons, the attacks beginning with symptoms of intense congestion and violent convulsions which follow each other rapidly. Opisthotonos. After scarlet fever or measles. Effects of sunstroke. Of no value beyond the early stage of irritation.—**BRYONIA.** Follows well after **BELLADONNA.** Intolerance of motion is well marked; the child lies perfectly quiet to avoid the aggravation from moving, especially of the pain in the head. Face dark-red, livid; mild delirium; sensorial depression; constant chewing motion of the mouth; lips dry; drinks greedily.—**CUPRUM.** History of a suppressed eruption; violent convulsions, with convulsive rolling of the eyeballs, clenched thumbs, pale face, blue lips; great sensitiveness in the region of the spine.—**HELLEBORUS NIGER.** Apathy; profound stupor; boring of the head into the pillow; hydrocephalic cry; wrinkling of the forehead; the eyes are staring, sunken, rolled upward, insensible; chewing motion of the mouth; automatic motion of one hand and foot; urine scanty and dark. Or violent general convulsions with complete unconsciousness, failure of the eyes to react to light, suppression of urine; drinks greedily when water is offered him; action of the heart feeble; pulse small, tremulous, intermittent; coldness of the body.—**ZINCUM (ZINC PHOSPHOR.)** Great heat at the base of the brain; sudden startings, as though frightened; constant restless movements of the feet; tremulousness of the muscles, jerking and twitching; convulsions.—**CICUTA VIROSA.** Insensibility; jerking and twitching of muscles of the face and body; neck rigid, head drawn backward, boring into the pillow; sudden violent shocks throughout the entire body, followed by spasms; pupils widely dilated; strabismus. Face red, hot, sweaty.—**OPIUM.** In the last stage.

Child unconscious; stertorous breathing; general coldness of the body, especially of the extremities; face often purple, hot, sweaty; tremulousness of the head, arms and hands, with, occasionally, jerkings of the muscles. Eyes half-open; insensible to light.

Consult also MERCURY, LACHESIS, ARNICA, GLONOINE, HYOSCYAMUS, STRAMONIUM, LYCOPODIUM, SILICA, POTASSIUM IODIDE (syphilis).

DISORDERS OF THE CEREBRAL CIRCULATION.

CEREBRAL ANÆMIA.

Deficiency of blood in the brain may be localized or general, usually the latter.

The ætiology embraces pressure upon adjacent parts of the brain by exudations, extravasation of blood or new growths; compression or obstruction of arteries supplying the brain; general bloodlessness from hæmorrhage; abstraction of blood from the brain by rapid distension of the blood-vessels in some distant part of the body (sudden distension of intestinal blood-vessels); general anæmia (fevers, chlorosis, starvation, etc.); vaso-motor disturbances (shock, fright).

Symptoms.—Acute cerebral anæmia begins with dizziness and ringing in the ears, dimness of vision, sense of weakness, disorder of the special senses, cold sweat, followed by loss of power of voluntary movements, extreme pallor of the face, dilatation of the pupils, unconsciousness. Recovery is gradual, consciousness returning first. Rarely death takes place from failure of respiration.

Slowly developing cerebral anæmia, if general, is characterized by apathy, headache with dizziness and dimness of vision, tinnitus aurium, bodily and mental enfeeblement, sleeplessness, despondency, mental confusion, melancholia, hallucinations, sometimes faintings and convulsions. It has been suggested that Marshall Hall's "spurious hydrocephalus" may be in fact a cerebral anæmia of infant life. In local anæmia, due to pressure of tumors, thrombosis, emboli, etc., the symptoms differ according to the area of the brain which is involved. Thus, im-

pairment of vision results from involvement of the cortex of the occipital convolutions; impairment of hearing or smell from anæmia of the temporal lobes; aphasia from anæmia of the base of the third frontal convolution and its immediate vicinity.

Treatment.—In syncope from acute anæmia the patient must at once be placed into the recumbent posture, cold water be dashed into the face, the body briskly rubbed, ammonia applied to the nostrils, and alcoholic stimulants administered. In the rare cases where this is not sufficient, it is well to apply a tight bandage around the leg or a roller bandage around both arms and legs; a weak saline solution, about a pint, thrown into the buttocks or transfusion is indicated in the last extremity. In the chronic form treatment must be addressed to the primary cause.

ŒDEMA OF THE BRAIN.

This condition is closely associated with cerebral anæmia. The most pronounced infiltrations are found in the neighborhood of cerebral tumors and abscesses. An acute œdema also occurs in chronic Bright's disease. Moderate effusions are common whenever there is atrophy of the brain. The symptoms are largely those of anæmia; but coma, convulsions and paralysis may be present.

CEREBRAL HYPERÆMIA.

This may be *active* or *passive*. Active cerebral hyperæmia is caused by sudden and severe chilling of the surface of the body, increased action of the heart, excessive brain work, dilatation of the cerebral arteries from weakness of their walls, sunstroke, alcohol, amyl nitrite. Passive cerebral hyperæmia is usually associated with defective venous return, and is seen in obstruction of the cerebral veins and sinuses, engorgement of the lesser circulation, pressure on the superior vena cava, prolonged expiratory effort and straining.

In spite of the seeming simplicity of the subject, it is in reality involved in the greatest obscurity, and the symptoms constantly attributed to cerebral congestion may be safely attributed to other and usually more complex causes. The simplest

form of hyperæmia of the brain is probably seen in the "congestive" headaches of plethoric persons, with marked flushing of the face and throbbing of the carotids; this condition, when very marked, may increase so that the symptoms reach a high degree of intensity, with deep redness and lividity of the face, vertigo, and loss of consciousness, sometimes with heavy, stertorous breathing. It is quite probable that in such cases of primary congestion there may be rupture of a blood vessel and a true secondary apoplexy.

The treatment consists of the administration of ACONITE, BELLADONNA, GLONOINE, VERATRUM VIRIDE or GELSEMIUM, as indicated by the symptoms. Much relief may sometimes be had from the use of a sharp purgative.

DISEASES OF THE BLOOD-VESSELS OF THE BRAIN.

CEREBRAL HÆMORRHAGE.

Hæmorrhage results from the rupture of an artery, oftenest of the middle meningeal artery. The hæmorrhage may be meningeal, or take place into the cerebral substance, or into the ventricles of the brain.

Ætiology.—Excepting cases of hæmorrhage directly due to some injury, the great majority of cases are the result of weakening of the walls of the vessels from disease (arterio-sclerosis) or from primary disease of the brain-substance (softening of the brain, carcinoma, etc.); of these, arterio-sclerosis is by far the more important; hence the greater frequency of cerebral hæmorrhage in men as compared with women, and in persons past the age of fifty, as compared with the young. Whatever causes arterio-sclerosis (see article on "arterio-sclerosis") is indirectly a cause of cerebral hæmorrhage. The term "apoplectic habit" refers to stout persons of more than average weight, usually broad-chested, with large head, round face, and short, thick neck, who, as experience has shown, are frequently the victims of cerebral hæmorrhage. Given a vessel whose walls

are weakened by disease, any sudden increase of blood pressure may rupture it; hence violent coughing (in children paroxysms of whooping cough) or vomiting, severe straining at stool or during childbirth, a quickly made and great muscular effort, even a violent emotion (as intense anger) may become exciting causes. Cerebral hæmorrhage may be an expression of a general hæmorrhagic diathesis (as found in purpura hæmorrhagica, scurvy, and in pernicious anæmia and leukæmia); it may also occur in severe infectious diseases, as typhoid and typhus fever, small-pox, septicæmia). Meningeal hæmorrhage is not infrequent in the fœtus as an incident of severe labor.

Morbid Anatomy.—The arteries which form the seat of the lesion show a condition of chronic periarteritis which weakens the wall of the vessel and results in small miliary aneurism, chiefly situated on the smaller branches of the cortical vessels. Upon section they appear as small, dark bodies, varying in diameter from 1 to 3 millimetres. Larger aneurisms occur in the branches of the circle of Willis. More rarely there is diffuse degeneration of the smaller vessels.

The hæmorrhage is *meningeal* usually as the result of violence or of gross aneurism. The effusion may be found between the dura mater and the skull, or may be subdural, or between the arachnoid and the pia mater. If resulting from rupture of an aneurism on a larger vessel, the hæmorrhage may be sufficient to extend high upon the cortex and to the cord; if arising from the middle cerebral artery, the Sylvian fissure is distended with blood. Extensive intracerebral hæmorrhage may burst into the meninges.

Intracerebral hæmorrhage is more common on the right side than on the left and occurs usually in the parts supplied by the striate artery ("artery of cerebral hæmorrhage." Charcot.) It may extend upward to the centrum ovale, outward to the insula, or inward to the lateral ventricles. Such hæmorrhages necessarily result in extensive tearing of the brain-tissues and the formation of an irregular cavity whose wall is made up of ragged and torn cerebral tissue, with contents consisting of a mixture of blood and débris of the nervous elements.

Ventricular hæmorrhage is nearly always secondary, blood from a hæmorrhage without bursting into the ventricle and not infrequently forcing its way into the other ventricle,

through the septum or the foramen of Monro. It occasionally occurs during childbirth and the puerperium, and in the fœtus during birth.

An extensive cerebral hæmorrhage in one of the hemispheres of the brain necessarily increases its size, puts the dura on the stretch, and by pressure flattens the cerebral convolutions. The blood-clot, when fresh, is of dark color; absorption of the liquid portion and probably of the fibrin takes place in due time, and eventually the hæmoglobin is converted into hæmatoidin and pigment granules, with a change in color to a reddish brown. By moderate inflammation the clot then becomes encapsulated in a wall of false membrane, the contents are softened and dissolved into a yellowish fluid, bands of connective tissue are projected from the cyst-wall, contracting the cyst itself and favoring the absorption of its fluid contents. These "apoplectic cysts" in favorable cases are formed in about two months after the hæmorrhage; they remain stationary. If the effusion was small, the contents of the cyst may be absorbed, the walls approach each other, and here only remains the "apoplectic scar," usually of yellow color from remnants of blood pigment.

A secondary degeneration (descending sclerosis), following the motor path downward, occurs when a clot of some size affected the motor centres or pyramidal tract. The descending degeneration proceeds from the motor centres of the cerebrum along the motor fibres (pyramidal tracts) into the posterior half of the internal capsule between the corpus striatum and the optic thalamus, continuing downward through the crus cerebri, pons varioli and medulla oblongata into the spinal cord.

Symptoms.—Prodromata are noted in some cases; they consist of headache, languor, tinnitus aurium, occasionally numbness, tingling, some pain in the extremities and muscular weakness. The duration of these varies from hours to days and months. In by far the greater number of cases the onset is sudden. When the hæmorrhage is severe, the patient, probably while engaged at his usual duties, especially when making a muscular exertion, suddenly drops unconscious, and is found unconscious and in a state of relaxation. In other and lighter cases the attack may occur during sleep; the patient is then

found unconscious in the morning or he may awaken in the morning finding himself paralyzed; or if the hæmorrhage is trifling and does not take place in a sensitive part of the brain, there may only be vertigo, headache, and passing loss of consciousness or mental confusion, nearly always with nausea and vomiting; or the patient may have threatening symptoms, and may even be unconscious, but get better, and then relapse; or, again, there may be no loss of consciousness at first, only a dazed condition, but in a few hours there is one-sided paralysis, followed by unconsciousness and profound coma (*ingravescent apoplexy*); or a small hæmorrhage, especially in the region of the central arteries, may involve the motor paths and cause hemiplegia without loss of consciousness.

The severity of the apoplectic seizures depends largely upon the extent of the bleeding and the rapidity with which it occurs (bleeding from large vessels being more dangerous than bleeding from small vessels), and upon the location of the hæmorrhage. The closer the location of the hæmorrhage to the cortex, the more pronounced the symptoms; hæmorrhage in the deep portions of the brain (*crura cerebri* or *pons*) often only sets up slight disturbance. But the shock from hæmorrhage into the deeper portions of the brain, i. e., the brain-stem, is much greater than the shock from hæmorrhage into the cortex or into the white matter of the hemispheres. This is due to the fact (Duret and Heubner) that the arteries within the brain-stem are not only larger, but that the arterial tension is much higher, thus accounting for both the frequency of hæmorrhages here and for the gravity of apoplectic symptoms from a hæmorrhage which would have done slight damage had it occurred in the cortex or white matter of the hemisphere.

During unconsciousness the face may be flushed, the pulse full, tense and slow, breathing slow, deep and stertorous, and there may be normal warmth of the body (congestive type); or the face may be pale, the pulse rapid and feeble, breathing quiet, and the body cool (syncopal type). These "types," however, are by no means clearly defined. Usually the pupils of the eye are fixed, staring, dilated, sometimes contracted. The bodily surface is moist. There may be Cheyne-Stokes breathing. The temperature may be normal at first, but is liable to fall somewhat within an hour, and may eventually become

subnormal (95°); a rapid rise of temperature (104° , and more) takes place when the hæmorrhage is in the medulla or pons; regardless of the location of the hæmorrhage, a rapid rise of the temperature is always an unfavorable sign. There is an increase of one-half to one degree in the axillary temperature on the paralyzed side over that of the unaffected side. The urine and fæces are passed involuntarily; the former, after the attack, is found to contain albumin and sugar. Convulsions are rare, but may occur at any stage. While in this state of unconsciousness the extremities are motionless and limp, and it is difficult to determine whether, or not, there is hemiplegia. The presence of paralysis may be recognized from the inequality of the angles of the mouth, from the greater puffing-out of one cheek during expiration, from the absence of motion in one arm or one leg, and from the absence of reflex action and defensive movements (against, say, prick of a pin) on one (paralyzed) side. Instead of a lax condition of the extremities, strong tonic rigidity is observed in exceptional cases, nearly always on the side opposite the hæmorrhage; it occurs usually, but not exclusively, when the lateral ventricle has become filled with blood.

In unfavorable cases unconsciousness remains complete; breathing becomes more and more irregular, hurried and shallow; the pulse grows rapid and weak; there is rattling in the throat and, after a high *ante-mortem* rise of temperature, the patient passes away. In other cases death seems to result from the fever and constitutional disturbances arising from inflammatory changes at and near the seat of the hæmorrhage. Extreme rigidity of the extremities, often with exaggerated reflexes, is common here. Trophic changes also complicate this class of cases in the form of a sloughing eschar or decubitus at about the middle lumbar region of the paralyzed side. It begins as a dark purplish erythema, from the surface of which arise vesicles or bullæ, containing an opaque, bloody substance; these rapidly terminate in destructive sloughing ulcers which in the process of separation frequently lay bare the deep tissues, even to the bone. Fatal cases usually terminate in from 24 to 48 hours, but death may occur within a few minutes after loss of consciousness, as in the case of hæmorrhage into the medulla.

In the great majority of cases the patient recovers with slow

return of consciousness. Exceptionally a relapse may take place from renewal of the bleeding, with increased liability to a fatal termination. The return to consciousness affords the opportunity for making a correct estimate of the paralysis which invariably results from the hæmorrhage.

The ordinary form of motor paralysis here noted is a simple hemiplegia on that half of the body which is opposite the seat of the hæmorrhage. It is said to be complete when the face, arms and legs are involved; incomplete when only one or the other are involved. Of the two, the former is the more frequent.

In the face the paralysis involves the same side as in arms and legs, since its relation to the cortical centres is the same, but the paralysis is practically limited to the lower part of the face. Thus, the forehead can be wrinkled equally on both sides, but one angle of the mouth hangs lower than the other and is drawn toward the healthy side; a voluntary muscular effort readily demonstrates this. The hypoglossal nerve is frequently somewhat involved, causing a deflection of the tongue, when thrust forward, toward the paralyzed side; to accurately determine the degree of this deflection the position of the tongue must be taken from the incisor teeth. The soft palate and uvula are rarely affected. Articulation may be somewhat disturbed; in some cases mastication is difficult from inability to retain the food between the teeth on account of impaired power of the muscles of the cheek. The arms are usually affected more severely than the legs, and may remain helpless after the use of the lower extremity has been largely recovered. With the exception of the trapezius, the muscles of the trunk almost always escape.

The term *crossed* or *alternate* hemiplegia is used to describe paralysis of the face and limbs on opposite sides. It occurs when the seat of the hæmorrhage is in the lower segment of the pons Varolii, the facial nerve, in such case, being involved after it has left its nucleus, while the involvement of the motor fibres of the arm and leg is above the point of decussation in the medulla.

Exaggeration of the tendon reflex on the paralyzed side is common; the superficial reflexes usually are diminished or lost; the sphincters are rarely involved. The sensory disturbances

are slight; hemianæsthesia is found only in exceptional cases. Slight numbness and tingling may exist, but soon pass off. Disturbances of special senses are equally trifling; the acuteness of hearing, taste and smell are usually somewhat diminished. A temporary hemiopsia may quickly follow cerebral hæmorrhage, and exceptionally a persistent hemiopsia may be associated with hemiplegia. Conjugate deviation of the eyes and head may occur during the stage of unconsciousness or even when there is no loss of consciousness; it may persist for a short time only or indefinitely; in fatal cases it usually disappears before death. The head and eyes generally are drawn very strongly away from the paralyzed side of the body, towards the lesion; the reverse may obtain, i. e., head and eyes may turn toward the paralyzed side. Vulpian and Prevost taught that in a lesion of the hemispheres the head is drawn toward the lesion and away from the paralysis, but that in lesions of the mesencephalon it is drawn away from the lesion and towards the paralysis.

The secondary symptoms seen in the paralyzed limbs are highly interesting. In very light cases the use of the limbs is recovered within a comparatively short time, and even the sense of weakness in them may gradually disappear. But even when hemiplegia is complete a certain amount of improvement takes place, and the patient's condition at the end of a few months has greatly changed for the better; it is notable that this improvement is much greater in the leg than in the arm, the patient often being able to get about, with the aid of a cane, when the arm remains practically useless. The shoulder joint is the last to show improvement. There is, however, more or less dragging of the affected leg, the toes cannot be taken from the ground, and the patient, by a conscious effort of the hip and knee, in walking swings the leg outward and forward in a half-circle. It is safe to affirm that any symptoms which outlast the first six months will not materially improve after that. Contractures occur later in the permanently paralyzed limbs, and their development may be accompanied with much pain. Charcot attributed their occurrence to secondary degeneration of the pyramidal tract. Here also the paralyzed arm suffers more than the leg. The fingers are flexed upon the wrist, the forearm is held in a position of par-

tial pronation, and the upper arm adducted. In the leg the contracture is usually seen best in the calf. The contractures differ from those of hysteria in that they do not disappear under an anæsthetic and are incurable. Hitzig called attention to the fact that these contractures are usually somewhat less pronounced in the morning than after the patient had moved about. In exceptional cases the paralyzed member remains permanently flaccid; this occurs oftener in the hemiplegia of children. Atrophy of the affected muscles is not great, and they react readily to electrical excitation. Tremors, choreic movements and athetosis are not uncommon, either as continuous movements or associated with voluntary movements of the paralyzed, or even of the sound, side. They are most frequent in the hemiplegia of children. In some cases there is arthritis, chiefly in shoulder joint and knee, with redness, pain and swelling from purulent effusion and destruction of cartilages and bone. The general health is not markedly affected, although the patient rarely maintains normal vigor of mind and body; usually he grows somewhat irritable and forgetful, and is easily provoked to laughter or tears; the body may be well nourished, but after years there is emaciation and special liability to fall a victim to intercurrent diseases.

Diagnosis.—The diagnosis usually is difficult when the patient is first seen during profound coma. It is necessary to determine the existence of an injury to the head and whether, or not, there is hemiplegia. The latter is indicated by the presence of conjugate deviation, rigidity or spasm on one side, and loss of tone of the muscles of one side as determined by raising the legs and arms and letting them drop, carefully observing and comparing the quickness and heaviness with which they fall. Inequality of the pupils, drawing of the face to one side, and “puffing” expiration are also signs of apoplexy. Nevertheless, mistakes may be made, for the coma of alcoholic poisoning, of opium poisoning and of uræmia may present striking similarity to that of cerebral hæmorrhage. In *alcoholic coma* the habits of the patient must be considered; the odor of alcohol may be detected in the breath; alcohol may be found in the urine; coma here usually develops more gradually than in cerebral hæmorrhage, and is rarely as profound; the pupils show no inequality. It must, however, be remembered that cerebral hæmorrhage

may exist with profound alcoholic intoxication. *Uræmic coma* may usually be distinguished by the presence of albumin and casts in the urine and of œdema or general anasarca; hence the necessity of prompt catheterization and examination of urine in suspected cases. The coma of *opium*-poisoning develops more slowly than that of cerebral hæmorrhage; breathing is more uniformly stertorous and slow, and the pupils are strongly contracted. Hæmorrhage into the pons bears very close resemblance to poisoning with opium. The coma of *epilepsy* is preceded by convulsions; the history of previous seizures determines the diagnosis. The arthritis which may develop in the course of hemiplegia differs from *chronic rheumatism* in its tendency to destruction of cartilage and bone. It is often limited to the paralyzed side, is associated with contractures, there is excessive tenderness to touch and movement, and rapidly developing œdema, with pitting on pressure.

Prognosis.—The prognosis as to recovery from cerebral hæmorrhage must always be guarded. Unfavorable symptoms are: very profound coma; rapid rise of temperature immediately after the primary fall; early formation of sloughing eschar; presence of a large amount of sugar and albumin in the urine; involvement of the pneumogastric nerve; pulmonary œdema; widely dilated pupils; paralysis of the sphincters. A favorable symptom is reaction on the second or third day, with moderate temperature followed by decline of the fever and returning consciousness. In aged people recovery is doubtful. Recovery may be complete from limited cortical hæmorrhage, especially after injury. Large hæmorrhage into the white matter of the brain, into the ventricles, and about the base is rapidly fatal. Hæmorrhage into the internal capsule is followed by persistent hemiplegia and contractures. Contractures and involvement of the joints are permanent. Involvement of the posterior fibres are often followed by hemianæsthesia, hemichorea or athetosis.

So far as recovery from the hemiplegia is concerned, the prospect is good in slight paralysis of the arm and face without profound loss of consciousness; if motor aphasia is complete, speech rarely becomes quite natural; if complete hemiplegia in adults persists for ten days, a full recovery cannot be expected; symptoms which have persisted for six months may be con-

sidered permanent; remaining clots or scars may become the cause of cerebral disturbances; there is a tendency to recurrence of cerebral hæmorrhage.

Treatment.—The patient must be put to bed without a moment's delay, and in so doing every unnecessary moving of his person must be scrupulously avoided, for even passive motion may prolong or increase the bleeding. In bed, the head and shoulders must be placed with the patient lying on the paralyzed side, to favor the escape of mucus and saliva from the mouth and to keep the tongue from falling backward and thus impeding respiration. Cold compresses may be applied to the head, or even ice-bags to the head and neck, if the hæmorrhage appears to be severe. If the attack has occurred right after a hearty meal, it may be advisable to empty the stomach by irritating the pharynx with the finger, or by the stomach pump. The bowels also should be relieved by a copious enema or by placing upon the tongue a drop of croton oil. The bladder must be emptied at regular intervals. The temperature of the room must be moderate, not more than 60°. During the first twelve, or more, hours no food is to be given, but acidulated drinks may be freely used. Stimulants may be exhibited in case of great febleness of the pulse and signs of approaching collapse. Particular pains must be taken to avoid the formation of bed-sores; hence there must be extreme cleanliness and the greatest possible care to avoid pressure, even to perfect smoothness of the sheet on which the patient lies. If, on account of coldness of the bodily surface, hot-water bottles are used, the danger of burns and their very serious consequences must be borne in mind.

Local bleeding (leeches on the forehead) and venesection is no longer fashionable, and is now only practiced when there is extreme arterial tension. Dawbarn seeks to accomplish the same purpose by cutting off the return circulation from the lower extremities; to this end he uses an Esmarch bandage or tourniquet as near the trunk as possible and just tight enough to materially obstruct the return flow through the veins without quite cutting off the current through the arteries; the pressure should be maintained for about an hour. To arrest the hæmorrhage, Horsley, influenced by experiments upon animals, advises the ligation or compression of the internal carotid.

As the condition of the patient improves, he may be given a liberal allowance of nourishing, easily digested food, of which milk and egg head the list.

The treatment of the hemiplegia consists chiefly of massage and electricity. Neither should be employed until three or four weeks have elapsed; if employed sooner, they are more liable to do mischief than good. Massage must be given by a person of experience and skill, and should be used once or twice daily, not to exceed ten or fifteen minutes. The faradic current may be used when there are no degenerative changes, its strength being just sufficient to produce slight muscular contractions; it should be used daily, in séances not to exceed ten minutes at first, and at no time longer than fifteen minutes. The galvanic current is preferable when changes of degeneration exist. Ranney advises galvanism until the faradic current shows its normal reaction. A very feeble galvanic current may be sent transversely through the head, for two or three minutes, or through the sympathetic nerve on the side of the hæmorrhage. Cool baths, followed by brisk rubbing, not to exceed three baths in the week, nor too prolonged, are also advisable. The patient must eschew the use of alcoholic stimulants and tobacco, avoid overexcitement and severe physical or mental exertion, not use the eyes too constantly, and live a quiet life, spending much of his time in the open air.

VERATRUM VIRIDE is beyond doubt useful when there is very high arterial tension and the apoplexy belongs to the congestive type; there may be convulsions.—GLONOINE. High arterial tension; congestive type of apoplexy; valvular disease of the heart; renal affections.—BELLADONNA. In the early stage of congestive apoplexy, with throbbing and beating of the carotids; face red and puffed up; convulsions; later, mouth drawn to one side; difficulty of swallowing; stupor; face deathly pale.—OPIUM. Our most valuable remedy when there is profound stupor, insensibility of the pupil, redness, bloatedness and heat of the face, sweating (hot) of the head, rigidity of the body, coldness of the feet, convulsive movements and trembling of the limbs, slow, stertorous breathing. "In threatening apoplexy of drunkards; the occiput feels as heavy as lead, and there is a tendency to stertorous respiration, with free perspiration, which does not relieve, with spasmodic jerkings of limbs,

numbness and variable pulse." (T. F. Allen).—LACHESIS. Symptoms threatening apoplexy, especially in drunkards and in persons who have atheromatous arteries; loss of consciousness; face blue, purplish; tremors in the extremity. Paralysis of the tongue, of the left leg.—ARNICA. Heavy stupor, stertorous breathing; head hot, rest of the body cool; foul breath; stools passed involuntarily; "apoplectic habit." Paralysis on the left side. Is said to hasten the absorption of the clot.—BARYTA CARBONICA "is an extremely valuable remedy in degenerative changes in the coats of arteries, aneurism, apoplexy as the result of senility," etc.—The treatment of the hemiplegia calls for NUX VOMICA or STRYCHNIA, CAUSTICUM (paralysis of face, eyes, pharynx, arms, legs, with muscular contractions), ZINCUM PHOSPHOR., and others.

CEREBRAL EMBOLISM AND THROMBOSIS (Cerebral Softening).

The occlusion of a cerebral vessel by an embolus or thrombus, causing arrest of circulation in the brain.

Ætiology.—*Embolism.* The embolus usually originates in the left heart, as a vegetation in recurring endocarditis or from ulcerating segments; less often from clots from the appendix of the auricle or small white thrombi. Blocking of the branches of the circle of Willis may be caused by atheromatous patches on the aorta, portions of thrombi from an aneurism or thrombi from the territory of the pulmonary vein. The cardiac affections most likely to give rise to thrombi are the chronic valvular diseases. Large emboli may lodge at the bifurcation of the basilar artery; following the blood current, they may enter the left middle cerebral artery, less often the posterior cerebral and vertebral arteries, rarely the cerebellar vessels.

Thrombosis or clotting of blood during life is usually due to the presence of an embolus around which the blood coagulates or to disease of the vessels. Of the latter, syphilitic endarteritis is the most common, but it occurs also in simple endarteritis. Other causes are: tubercular growths in the vessels, aneurisms, and ligation of the carotid. A disposition to clotting of blood is peculiar to marasmus, phthisis, chlorosis and the puerperal state. "Thrombosis and embolism may

each give rise to the other. From every thrombus an embolism may be detached; and every firmly lodged embolus may form a nucleus for thrombosis." (Struempell.)

Morbid Anatomy.—If in case of thrombosis collateral circulation can be established, which is difficult when the arteries are "terminal," no harm results; if collateral circulation is not established, degeneration and softening of the structures thus deprived of nourishment invariably results. The tissues perish, undergo disintegration, and are transformed into a soft, homogeneous mass, composed of broken and swollen nerve-fibres, fatty granular cells, free fat-globules, and a few drops of myeline. Relief afforded at this time by collateral circulation may restore the tissues; this relief not being had, the fatty matter is absorbed, chiefly by the leucocytes; gradually further absorption of the dead and disintegrated tissues takes place, and eventually cysts and cicatrices are formed, as in the process of absorption of the blood-clot of cerebral hæmorrhage. In case the softened area is superficial, a depression may result which is filled with serous fluid and by hyperplasia of the pia mater. The convolutions are atrophied, yellowish, and rather firmer than normal from the presence of cicatricial tissue. The color of the area of softening depends upon the presence of extravasated red corpuscles which by forming numerous little punctiform ecchymoses (capillary apoplexy) may give to the part a distinctly red or a reddish color. Yellow staining of the tissues arises from dissolved pigment of the disintegrated blood corpuscles. "White" softening means very slight staining of the parts.

Symptoms.—Very extensive softening may occur and not give rise to symptoms during life, as is frequently the case in the yellow softening (*plaque jaune*) of elderly persons. In the greater number of cases, however, symptoms occur, and these bear a striking resemblance to those of cerebral hæmorrhage.

In *embolism* the onset is nearly always sudden and, in case of blocking of the left middle cerebral artery, aphasia may be associated with the hemiplegia. In *thrombosis* the onset usually is gradual, and premonitory symptoms like those preceding cerebral hæmorrhage (headache, vertigo, lassitude, numbness, tingling, mental incoherency, paralytic weakness) may persist for a long time. Paralysis occurs with or without sudden loss of consciousness, usually affects an arm, and ex-

tends slowly. Sudden loss of consciousness is more frequent in embolism than in thrombosis. There may be temporary palsies, probably from the formation and, later, dissolution of a fibrinous thrombotic clot. The temperature, though not affected at once, usually rises to 101°. Convulsions occur oftener in embolism than in thrombosis. In some cases, as in the thrombosis of syphilitics, there may not only be loss of consciousness, but the patient may lie in a comatose condition for many days, even weeks; it is nevertheless very rare to see the threatening symptoms which characterize the profoundly apoplectic state. The focal symptoms and the hemiplegia, with its secondary effects, do not differ from those of cerebral hæmorrhage.

Occlusion of different arteries must of necessity be followed by symptoms which vary in accordance with the relation of the affected artery to certain parts of the brain and the functions which belong to them.

Occlusion of the Carotid.—No symptoms, or hemiplegia which disappears after establishment of collateral circulation. An embolism or thrombosis may form in the skull and eventually invade the circle of Willis, causing coma and death or, if not fatal, hemiplegia and various palsies.

Occlusion of the Vertebral Artery.—Usually hemiplegia, preferably on the side of the occlusion, with difficulty of swallowing and articulation, and temporary anæsthesia. Involvement of the nuclei in the medulla results from occlusion of the left branch (acute bulbar paralysis).

Occlusion of the Basilar Artery.—Sudden death from involvement of the respiratory centres. In complete occlusion there may be bilateral paralysis and bulbar symptoms, with hyperpyrexia and death within a few days. In case of partial recovery, softening in the medulla and pons, with localizing symptoms.

Occlusion of Anterior Cerebral Artery.—Usually establishment of collateral circulation through anastomoses between the anterior and middle cerebral arteries. Sometimes loss of smell from softening of the olfactory bulb. Occasionally hebetude and dullness of intellect.

Occlusion of the Middle Cerebral Artery.—The artery most frequently involved. If plugged low down, often permanent

hemiplegia from softening of the internal capsule. Aphasia from involvement of the left artery. Occlusion above the arteries going to the centre of the brain gives rise to cortical paralysis and aphasia (left artery); occlusion of the first branch causes softening of the third frontal, of the second and third branches softening of the ascending frontal, and of the fourth branch softening about the posterior limb of the fissure of Sylvius, with sensory aphasia. Ptosis may occur on the side opposite the hemiplegia. (Gowers.)

Occlusion of the Posterior Cerebral Artery.—Abundant collateral circulation here often renders existing paralyses temporary. There may be hemianopsia from occlusion of the branch passing to the cluncus, and hemianæsthesia from softening of the posterior part of the internal capsule.

Diagnosis.—It is practically impossible to make a positive diagnosis between cerebral hæmorrhage and embolism or thrombosis. When the patient suffers from chronic valvular disease or some other affection which is likely to be the source of an embolus, when the patient is young, and when the existence of embolism can be demonstrated elsewhere, as in the fundus of the eye, a diagnosis of embolism is safe. The symptoms of cerebral hæmorrhage are usually more profound, the stupor is more pronounced, and stertorous breathing is a conspicuous symptom.

The prognosis is always serious, and recovery from the paralysis is less promising than in the forms arising from intracranial hæmorrhage.

Treatment consists of absolute rest, careful nursing, and the exhibition of such remedies as are symptomatically indicated. Cardiac stimulants should not be used, except as positively demanded by threatening heart-failure. MERCURY and POTASSIUM IODIDE are useful when there is syphilis. Otherwise the treatment indicated under "Cerebral Hæmorrhage" and its secondary effects is applicable here.

CEREBRAL ANEURISM.

There are two forms: the small miliary aneurism and the gross aneurism of the larger vessels; of these, the latter is here considered.

Aneurism is nearly always associated with simple or syphi-

litic endarteritis (endocarditis), which results in weakness of the wall, dilatation of the vessel, and commonly embolism. Most frequently the middle cerebral arteries are involved.

The size of an aneurism here varies from that of a pea to a walnut. The symptoms produced are those of pressure and irritation, according to its relation to other parts (thus, aneurism of the internal carotid may compress the optic nerve or the chiasma, resulting in optic neuritis). The aneurism may suddenly burst and cause apoplexy. A diagnosis is possible only in exceptional cases.

THROMBOSIS OF THE CEREBRAL SINUSES.

Thrombosis of the sinuses may be primary or secondary. The primary occurs in connection with exhausting diseases of children (in young infants chiefly diarrhœa), chlorosis and anæmia, and in the terminal stages of phthisis, cancer, and other diseases characterized by a cachexia ("marantic" thrombus). The secondary and more common form is the result of extension from other parts, as disease of the internal ear, suppurative affections outside the skull, especially erysipelas; in the latter, extension of the disease occurs along the nerves. In the secondary form the lateral sinus is commonly affected.

Symptoms.—The condition may be latent, as in the involvement of only one sinus in young children, or the cerebral disturbances may be lost in the severity of other symptoms. In many cases there is headache, mental dullness, high fever, vomiting, coma, delirium and, later, localizing symptoms. If the *longitudinal* sinus is occluded in young children, there is dilatation of the veins of the scalp in the region of the great fontanelle, sometimes convulsions and vomiting, and occasionally exophthalmus. Thrombosis of the *transverse* sinus is usually associated with involvement of the jugular vein on the same side, often with painful œdema of the ear and mastoid region. In thrombosis of the *cavernous* sinus there is occlusion of the ophthalmic vein, followed by exophthalmus, œdema of the upper eyelid, swelling of the conjunctiva and face, chemosis, palsy of the oculo-motor nerve. In secondary thrombosis the symptoms are largely those of a secondary septicæmia; there is headache, chills and fever, sometimes earache, vomiting, delirium, coma, convulsions; optic neuritis may be

present. A typhoid condition develops later, with death usually from pulmonary pyæmia. Pitts states that the appearance of acute local pulmonary mischief or of distant supuration is almost conclusive of thrombosis.

The treatment is limited to surgical measures. When it is possible to localize the thrombosis, trephining and evacuation of the sinus, with free drainage, may prove efficient. Pitts has tied the internal jugular vein in the neck, opened the lateral sinus, and scraped out the clot, followed by satisfactory recovery of the patient.

APHASIA.

“Aphasia in the widest sense of the word may be taken to embrace disturbances either at the sensory perceptive centres of hearing and sight and in the blind of the touch; of the emissive or motor centres of speech and writing; or of the psychical centres through which we gather rational conceptions of what is said or written, and by which we express voluntarily our ideas in language” (Wm. Osler). Strictly speaking, *aphasia* is concerned with disturbances of the central apparatus, the receptive, perceptive, and emissive centres in the cerebral cortex; disturbances of the centres which preside over the mechanism of speech are known as *anarthria*.

Aphasia may be sensory or motor. In the former there is disturbance of the psychical and sensory perceptive centres; in the latter there is involvement of the emissive for speech and writing.

Sensory Aphasia.—The power to recognize objects, their nature and character, is essential; its loss is known as *apraxia*, and is closely associated with many forms of sensory and motor (ataxic) aphasia.

The following description by Starr is clear and helpful: “It is a fundamental position involved in the accepted theory of cerebral localization that memories are the residua of perceptions, and are therefore localizable in the regions of the brain concerned in perception. It follows that these memories forming the idea of an object or an action, being distinct from one another, may be lost by disease of the brain having a limited extent, and that the character of the memories lost will depend on the location of the disease. Now, cases have been recorded

in which persons acted as if they no longer possessed such object memories, for they failed to recognize things formerly familiar. A fork, a cane, a pen may be taken up and looked at by such a person, and yet held or used in such a manner which clearly shows that it awakens no idea of its use. And this symptom, for which at first the term 'blindness of the mind' was used, is found to extend to other senses than that of sight. Thus the tick of a watch, the sound of a bell, a melody of music, may fail to arouse the idea which it formerly awakened, and the patient then has deafness of mind; or an odor or taste no longer calls up the notion of the thing smelt or tasted, and thus it is found that each or all of the sensory organs, when called into play, may fail to arouse an intelligent perception of the object exciting them. For this general symptom of inability to recognize the use or import of an object the term apraxia is now employed. And since apraxia is a symptom which is very frequently associated with aphasia, and which, in fact, may lie at the basis of aphasia, it should always be looked for in a patient. To test for apraxia it is only necessary to present various objects to a person in various ways, and notice whether he gives evidence of recognition. * * * The patient may or may not be able to name these objects; that, at present, is not the question. But is it evident that the object awakens an idea in the mind?"

The most important forms of apraxia are mind-blindness (visual amnesia) and mind-deafness (auditory amnesia).

Mind-blindness may be functional and passing or a feature of organic disease of the brain. The affection usually involves the angular and supra-marginal gyri or the tracts which proceed from them, probably in the left hemisphere in right-handed persons and in the right hemisphere in left-handed persons. A patient afflicted with mind-blindness may see an object, but there is no intelligent impression of its character; he may see in a man standing before him some sort of an object, but will not be able to recognize this object as a man until the man speaks, and the auditory centres are thus utilized in the recognition of the person. *Word-blindness* is a condition in which the patient does not recall the appearance of words; he does not recognize them when written or printed. He may be able himself to write correctly, but, once written, the same words convey no mean-

ing to him. This condition is sometimes associated with mind-blindness and commonly with hemianopia. The seat of the lesion, in the greater number of cases, is in the angular and supramarginal gyri on the left side.

In *mind-deafness* cognizance is taken of sounds, but they awaken no intelligent conception; much as the sounds of an unknown language, though heard, convey no meaning, awaken no auditory memories. *Word-deafness* is an inability to understand spoken language; the words are heard, but no longer possess any meaning. Cases of word-deafness are reported in which the patient was able to read, write and speak.

In *motor (ataxic) aphasia* there is a loss of memory of the efforts which are necessary to set into action the speech-mechanism, the muscles of phonation and articulation. The patient is able to read to himself, not aloud, and understand what he reads, as he also understands conversation; but he is not able to reply. He knows what a certain object is, and what its uses are, but cannot call it by name, though he may be able to repeat its name after someone else has pronounced it first. The lesion is in the third left convolution. (Broca.)

Other forms are: *Agraphia* or loss of the power of expression by written words; *aglyphia* or loss of the power of picture-making; *ataxic amusia* or loss of the power of expression by musical tones; *musical agraphia* or loss of the power of writing music; *ataxic amimia* or loss of the power of expression by gestures. Since any of the forms of aphasia may be complete or partial, the prefix "par" is used to indicate the latter; to illustrate, *alexia* means complete word-blindness, *paralexia* means partial word-blindness.

Osler directs that the following tests be applied in each case of aphasia: (1) The power of recognizing the nature, uses and relations of objects, i. e., whether apraxia be present, or not; (2) the power to recall the names of familiar objects seen, smelled or tasted, or of a sound when heard, or of an object touched; (3) the power to understand spoken words; (4) the capability of understanding printed or written language; (5) the power of appreciating and understanding musical tones; (6) the power of voluntary speech,—in this it is to be noted particularly whether he misplaces words or not; (7) the power of reading aloud and of understanding what he reads; (8) the

power to write voluntarily and of reading what he has written; (9) the power to copy; (10) the power to write at dictation; and (11) the power of repeating words.

Usually aphasia is the result of organic disease of the brain-cortex or of the conducting nerve-fibres which pass from the cortex to the cord. Sometimes it is an expression of exhaustion of the brain and may be a feature of what has been called a "nerve-storm," or it may be hysterical, or, rarely, due to reflex inhibition from gastric or intestinal irritation. Disturbances of the function of speech are in all probability due to injuries of nerve-fibres starting in the cortical centres, either commissural fibres or fibres which pass directly downward to the lower ganglia.

The treatment of aphasia demands special experience and special facilities, largely of an educational character; and these often prove ineffective. In young persons, education of the centres of the side of the brain opposite to the lesion often proves successful, and the patient learns to talk with readiness. In adults recovery takes place slowly and is not likely to be complete. Cases of complete aphasia with right hemiplegia are not promising. It may be accepted as a rule that motor aphasia of several months' standing without any improvement is hopeless.

CEREBRAL PALSIES OF CHILDREN.

HEMIPLEGIA.

Ætiology.—According to statistics, this affection of children usually occurs during the first and second years of life and is infrequent after the fifth year has been passed; it appears to be somewhat more frequent in girls than in boys. Many cases undoubtedly result from cerebral hæmorrhage, caused from injury received by the use of forceps during birth, or later from falls, and occasionally from violent paroxysms of whooping-cough. Cases are also seen at the height of infectious fevers (scarlet fever, measles, whooping-cough, etc.) or following them. In some instances they have followed punctured wounds. In about one-half of all the cases the disease sets in with severe convulsions.

Morbid Anatomy.—The most common feature observed is

cortical sclerosis and porencephalus, i. e., cortical cysts which communicate with the arachnoid spaces and penetrate deeply into the brain. The initial lesion is in doubt.

Symptoms.—Frequently the disease begins with severe indisposition, fever, nausea and vomiting, followed by cerebral disturbances, chiefly stupor and convulsions, continuing for several days or even two weeks, or more. In other cases a rugged child, evidently in perfect health, is suddenly taken with convulsions and loss of consciousness; the convulsions may recur for several days, during which time unconsciousness persists. When consciousness returns, and the child begins to move about, hemiplegia (sometimes monoplegia) is noticed. Occasionally the palsy occurs suddenly or gradually without previous serious illness, convulsions or unconsciousness. If on the right side, aphasia may be observed. Frequently the face is not involved.

In many cases more or less complete recovery takes place, in the leg sooner and more fully than in the arm, although there is usually a slight hemiplegic gait. In the arm contractures are not rare; motion in it may be lost, save slight motion in the shoulder joint. In the majority of cases there is marked late rigidity; exceptionally the limbs are flaccid. Atrophy is pronounced; reflexes are heightened; sensation is rarely disturbed. There is frequently retarded mental development, occasionally bordering upon feeble-mindedness; epilepsy, local or general, occurs in a large proportion of cases, sometimes with idiocy; in still others, there are "post-hemiplegic" movements (Weir Mitchell) consisting of tremors and vibratory movements, or incoördinate choreiform movements, or athetosis. The latter, first described by Hammond, consists of involuntary and usually slow movements which are seen chiefly in the arms and hands, but also in the head, trunk, and other parts. If in the hand, the fingers are incessantly separated, extended, twisted, flexed, assuming all kinds of strange and phantastic positions. The interossei are chiefly involved. The articulations finally become so relaxed that an astounding hyperextension of the fingers becomes possible. These movements usually cease during sleep and are quickly aggravated from excitement.

SPASTIC DIPLEGIA.

A form of infantile paralysis with spasms of the extremities, usually dating from birth; it constitutes the most serious form of birth-palsies. It is caused by injuries received during a severe labor, as from obstetric forceps or some hurt to the cerebro-spinal meninges in case of a foot-presentation. Frequently there was asphyxia or convulsions of the new-born child. The pathological feature usually is a meningeal apoplexy, with copious hæmorrhage over the motor region.

Symptoms.—In many cases the child at first appears normal. Later it is noticed that it has not full use of its arms and legs; attempts to walk show the disability of the legs; often the muscles of the neck seem unable to support the head. The child cannot stand on its feet; when it makes the attempt, it rests on the toes and inner surface of the feet; the legs may cross each other from spasm of the adductors. Rigidity of the limbs is remarkable, particularly so in the legs. Both muscular weakness and spasms usually show a preference for one side. Convulsions occasionally occur. Bilateral athetosis is seen in exceptional cases, affecting the facial muscles as well as other parts of the body, and usually is very severe. The reflexes are exaggerated. Feeble-mindedness and idiocy are frequent.—A *spastic paraplegia* has been described and is not infrequent. It also is due to hæmorrhage during delivery. The cerebral origin of the spasms and paralysis is strongly indicated by the presence of other symptoms of brain disorder, as mental weakness, nystagmus, etc.

Diagnosis.—The condition which must be differentiated from the birth palsies is the *pseudo-paralytic* rigidity of rickety children and of children suffering from debilitating disease, chiefly diarrhœa. Differentiation depends upon the association of this state of spastic rigidity with rickets, chronic diarrhœa and hydrocephaloid states; furthermore, the spasms here are usually limited to the hands and arms; the affection is painful, intermittent, and limited in duration.

Treatment.—The convulsions must be managed as indicated under "Eclampsia." The paralyzes demand the measures discussed under "Cerebral Hæmorrhage." The tendency to improvement here should be a great incentive to put forth special

efforts and to increase the extent of the recovery by close attention to the diet of the child and to the maintenance of such care as will tend to keep its general health as nearly perfect as possible. Deformities must be treated mechanically and surgically. Serious enfeeblement of the mind requires educational efforts which are more successfully employed in public institutions than they can be at home.

INSULAR SCLEROSIS OF THE BRAIN.

A chronic disease of the brain, characterized by the existence in the brain (and usually in the spinal cord as well) of patches of connective tissue replacing the normal brain matter.

Ætiology.—The affection belongs to adult life, chiefly to the third and fourth decade of life, but it may occur in the young. It seems to “run” in certain families and shows a slight preference for males. Its development often is insidious and without known cause. To some extent exposure, injuries and mental shock seem to be connected with it. Marie thought that the focal myelitis which follows certain fevers (scarlet fever, measles, diphtheria, etc.) may result in sclerosis.

Morbid Anatomy.—The sclerotic patches are usually seen in the white substance of the brain, chiefly near the ventricles, centrum ovale, corpus callosum, pons, less often in the medulla; they are reddish-gray, slightly translucent, and measure from two to thirty, or even forty, millimetres. The cortex may look natural. The spots are nearly always seen in the spinal cord as well; sclerosis limited to the brain or to the spine alone hardly ever occurs. Under the microscope the plaques are found to consist of dense reticulated fibrous tissue, which in fresh cases often contains fatty granular cells. Charcot pointed out that the axis-cylinders resist for a long time and do not disappear until late in the disease. Fatty or sclerotic degeneration is seen in the thickened walls of the blood vessels in the immediate neighborhood of the plaques.

Symptoms.—The onset of the disease is insidious and difficult of recognition. The most characteristic symptoms are: *Tremors*. These are intentional, volitional, and may affect the arms, legs and head, but are most pronounced in the former, rendering the use of the arms difficult and uncertain. The tremors are un-

equal, jerking, in this respect unlike the tremors of paralysis agitans. They are exaggerated by efforts to use the limbs and by mental excitement; they disappear usually during rest and sleep. *Scanning speech*, probably due to disturbance of motor innervation of the speech-organs from sclerotic involvement of the pons and medulla. Speech is labored, pronunciation slow and painstaking, there is a striking sameness in the pitch of the voice, and often tremulous movements of the lips and tongue while talking. Speech eventually becomes indistinct. *Nystagmus*, slight, usually lateral oscillating movements of the eye-balls on fixation.

Incidentally there may be seen vertigo, rarely coma; mental enfeeblement may occur; the sensations usually remain intact; optic atrophy is rare; late, the sphincters may become involved.

Diagnosis.—This is not difficult in typical cases; in anomalous cases it may be impossible. When the spinal cord is extensively affected the case may present the appearance of a lateral or posterior spinal sclerosis. Frequently it resembles Friedreich's ataxia, but in the latter the tremors are not volitional, are much slower, and there is incoördination.

The prognosis is exceedingly serious; in fact, hopeless. The course of the disease is intensely chronic and misleading. Remarkable temporary improvement occurs often, but eventually the patient becomes bed-ridden and dies from involvement of the medulla or from some intercurrent disease.

The term *miliary sclerosis* is applied to small grayish-red spots scattered over the convolutions of the brain or found, as in a case of Gowers, at the junction of the white and gray matter; this condition causes no symptoms. *Diffuse sclerosis* involves an extensive area, an entire lobe or a hemisphere. When the cortex of one hemisphere is extensively sclerotic, it causes unilateral atrophy of the brain. Hemiplegia, diplegia, imbecility or idiocy are present in the greater number of cases. *Tuberous or hypertrophic sclerosis* consists of sclerotic areas on the convolutions, of opaque white color, very firm on section, and projecting somewhat beyond the surface of the convolutions.

The treatment of cerebral sclerosis is purely symptomatic and only serves to keep the patient as comfortable as possible and to maintain life. ARSENICUM is of special value.

INFLAMMATION OF THE BRAIN ; ABSCESS OF THE BRAIN ; SUPPURATIVE ENCEPHALITIS.

Ætiology.—Idiopathic abscess of the brain is rare. Nearly always infectious material has been carried to the brain, sometimes through the blood from septic processes going on in distant parts. Trauma is a frequent cause, involving wounds of the head (scalp), fractures of the skull (preferably compound fractures) and suppuration following local disease (periostitis, nasal polypi). Other factors are: Extension of suppurative processes arising from disease of the ear (otitis media, disease of the petrous bone). Septic processes in distant parts, as acute periostitis, ulcerative endocarditis, suppurative disease of the liver or lungs and pleura (fetid bronchitis, bronchiectasis, pulmonary gangrene, empyema). Specific fevers and influenza. Struempell states that he saw several cases at the time of an epidemic of cerebro-spinal meningitis; he thinks it possible that their appearance was due to the same specific poison.

Morbid Anatomy.—Suppurative meningitis is common in cases associated with trauma. Abscess may be solitary (in four-fifths of all the cases) or multiple, varying in size from that of a walnut to an orange, and larger. The pus usually is reddish white; if encapsulated, creamy and greenish, without odor or offensive (like sulphuretted hydrogen). The surrounding brain-tissue usually is œdematous, and may be softened. In rapidly fatal cases suppuration may be diffuse. Oftenest the abscess is located in the white matter of the hemispheres. If near the surface, there may be considerable bulging and fluctuation. When due to injury or pyæmia, its seat usually is the frontal lobe and the centrum ovale; when arising from otitis, the abscess is nearly always located in the temporo-sphenoidal lobe or in the cerebellum.

Symptoms.—In many cases abscess may form and exist for a long time in the brain without giving rise to symptoms; this, according to some authorities, applies particularly to idiopathic cases and to those which result from trifling injuries. It appears, however, that the location of the abscess is a much more important consideration. It is well known that large abscess may exist in the frontal and lateral cerebellar lobe without for a long time giving rise to appreciable disturbance,

evidently for anatomical reasons. In cases of abscess resulting from extensive injuries, or developing acutely and rapidly, the symptoms are those of acute meningitis, i. e., rigors, irregular fever with rapidly rising temperature, severe headache with pain often at the seat of the abscess, vomiting, either independent of eating or after taking food. When resulting from otitis, symptoms of cerebral irritation are usually most pronounced at first, often with severe pain in the head and about the ear. Later there is drowsiness, mental apathy, with vomiting and sometimes, especially when the abscess is large, optic neuritis. Pallor, loss of appetite and emaciation are commonly present. Again, the latency of the symptoms may be prolonged even for months, no cerebral disturbances whatever existing, or being so indefinite as to excite no suspicion of serious trouble. Suddenly violent headache, rigors, high fever, vomiting and coma set in or there appear focal lesions (aphasia, facial paralysis, paresis of face and arms) which call attention to the brain.

Diagnosis.—This depends upon the demonstration of an adequate cause (see *ætiology*); upon the presence of symptoms which indicate cerebral disturbance; the exclusion of cerebral tumor by the presence of high and irregular fever and, often, rigors; the absence, usually, of choked disk; the rarity of disturbances in the area of distribution of nerves at the base of the brain (as paralysis of the motor oculi muscles). In case of abscess following otitis it is difficult to determine whether the abscess is in the brain, in the sinuses, or subdural. Localization of the lesion is important, but quite uncertain. In the frontal cerebral and lateral cerebellar lobe an abscess may exist indefinitely and not give rise to symptoms, save, perhaps, a certain degree of mental dullness. This also applies to the temporo-sphenoidal lobe, unless a very large abscess should be located on the left side, in which case the motor zone (face and arm) or the speech-centre may be affected. Abscess in the Rolandic region may cause convulsions from irritation or paralysis from destruction of the centres. Abscess in the middle lobe of the cerebellum may disturb equilibration. Hemianopia may result from abscess in the parieto-occipital region, but even a large abscess there may create no disturbance.

The prognosis is unfavorable unless the abscess can be evacuated.

The treatment then, is practically surgical, and under modern methods of operating the results achieved often have been highly gratifying. The usefulness of such remedies as ACONITE, VERATRUM, ARNICA and GELSEMIUM during the fever, and later of ARSENICUM, CHINA, SILICA, and others, suggests itself. The value of a generous diet is evident.

TUMORS OF THE BRAIN.

Intracranial tumors may occur at any age, but are most frequent in early middle life; some new-growths, especially solitary tubercle, have a preference for the young. It is affirmed that men suffer from brain-tumors oftener than women. The following forms are observed: *Syphiloma*. These usually develop on the pia mater or on the arteries, are common in the hemispheres and pons, may be single or multiple, rarely exceed the size of a walnut, are irregular, rather soft, and on the growing surface present a grayish, gelatinous appearance. *Tubercle*. They are single or multiple. Common in young persons of less than twenty years of age. Solitary tubercles may attain the size of a walnut. Occur in pons, cerebellum, cortex. Upon section prove soft, cheesy, yellowish; surrounded by softened tissue; may undergo calcification. *Sarcoma*. May develop in the brain substance, but oftener in the connective tissue of adjacent parts, dura mater, or in the cranium or its periosteal covering. May be round-celled or spindle-celled. May form very large tumors, often at the base of the skull. May grow from within outward, perforate the skull and appear as an external tumor. *Glioma and neuro-glioma*. Originate in the neuroglia. They are not readily recognized because their outlines are indefinite and they shade gradually into the healthy tissue, producing some enlargement of the area invaded without materially altering its shape. Some are of slow growth, firm and hard; others grow rapidly, are soft and very vascular, sometimes giving rise to sudden bleeding into the new growth. They are found in the white matter of the cerebral hemispheres, also in the central ganglia, cerebellum, and in other parts of the brain. *Carcinoma*. Are nearly always secondary to cancer in other parts, chiefly of the breast, lungs, and pleura. May perforate

the bone and appear as an external tumor (fungus hæmatodes). Cysts may be found in any part of the brain and of great diversity. Among them we find apoplectic cysts, chiefly about the basal ganglia; dermatoid cysts; porencephalus; cystic disease of the choroid plexus; parasitic cysts (cysticerci, echinococci). Rarely observed are fatty tumors, bony growths (in falx and tentorium), aneurisms, psammoma, cholesteotoma.

Symptoms.—*General symptoms.* Certain general symptoms are found in all cases of new growth in the brain; they are largely the result of compression from the increasing enlargement of the tumor. The convolutions are flattened, even obliterated; the dura mater is thinned and possibly perforated (“worn through”) or thickened by chronic inflammation; the very bones of the skull may be worn, thinned or perforated and their sutures loosened. Serous effusion into the ventricles is a common effect of the intracranial tension. *Headache* exists from beginning to end. It may be general or localized. If the latter, it is usually associated with tenderness upon pressure. The headache is generally dull, deep-seated, with sense of heaviness; it is aggravated from a jar, from stooping, from any cause that increases blood pressure. It varies in severity from a dull, endurable ache to pain of maddening intensity; it is continuous, with periods of great exacerbation, especially at night. It is not always worst at or near the seat of the tumor; thus, intense pain in the frontal region may be caused by a tumor in the cerebellum; on the other hand, persistent occipital headache indicates a new growth in the posterior fossa. The pain may radiate in the cranial nerves.

Optic neuritis (choked disk) is present in four-fifths of all the cases (Gowers); usually it is double. It has nothing to do with the size of the tumor. Since optic neuritis may exist without loss of vision, it must be looked for by ophthalmoscopic examination of the eye. It consists of “swelling of the disk, marked distension and tortuosity of the veins, possibly hæmorrhage from passive congestion, and cloudiness of the disk, although the retina still exhibits its normal transparency.” Eventually there is atrophy of the nerve, with partial or complete loss of sight. *Mental symptoms.* The patient grows dull, listless, stupid. He is indifferent to everything about him, takes no interest in anything. He talks slowly, looks weary and sleepy,

pays no attention to his dress or appearance. The memory becomes impaired. Often he is hysterical. Hallucinations and delusions are not infrequent. *Vertigo* and *vomiting*. Both are common and closely connected. The vertigo is particularly troublesome in tumors at the base and cerebellum, and is aggravated when arising from a recumbent position. It probably depends upon disturbance of the central mechanism of equilibration. Vomiting has no definite relation to taking food and is not accompanied with nausea. It is frequent in all tumors about the central ganglia and at the base, and particularly prominent in the intracranial growths of children. *Convulsions* occur in many cases; they are of an epileptiform character, and may be localized (Jacksonian) or general. *Petit mal* is rare. There may be tetanic rigidity of certain groups of muscles. *Fever* is not usually pronounced, save in cases of exceptionally rapid growth of the tumor. Occasionally there is an increase in the temperature of the head, possibly over the site of the tumor. The pulse in the majority of cases is slow, from 45 to 60 beats per minute; it may be irregular. Emaciation is pronounced. Syncope and even apoplexy may result from hæmorrhage into the substance of the new growth (glioma). Coma and Cheyne-Stokes breathing usually set in toward the end.

Focal Symptoms—(After Osler.)—*Central Motor Area*. Symptoms are irritative or destructive. Irritation in the lower third may produce spasm in the muscles of the face, in the angle of the mouth, or in the tongue. The spasms with tingling may be strictly limited to one muscle group before extending to others. (Seguin's *signal symptom*.) The middle third of the motor area contains the centres controlling the arm, and here, too, the spasm may begin in the fingers, thumb, muscles of wrist, or shoulder. In the upper third of the motor areas, spasm beginning in the toes, ankles, or muscles of the leg. Decide: the point of origin (*signal symptom*), the order or march of the spasm, the subsequent condition of the parts first affected, whether paresis or anæsthesia. Destructive lesions in the motor zone cause paralysis, often preceded by local convulsive seizures in the arm, often due to irritation in these centres. Tumors in the neighborhood of the motor area may cause localized spasm; upon invasion of the centres, paralysis. On

the left side, growths in the third frontal (Broca's) convolution may cause motor aphasia.—*Prefrontal region.* Mental torpor and gradually developing imbecility. Aphasia from involvement of the lower frontal convolution. Neither motor nor sensory disturbances may be present.—*Parieto-occipital Lobe.* May be no symptoms. Word-blindness and mind-blindness when the angular gyrus is involved, and paraphasia.—*Occipital Lobe.* Hemianopsia; blindness when the lesion is bilateral. If on the left hemisphere, may be associated with word-blindness and mind-blindness.—*Temporal Lobe.* No disturbance. In their growth involve the lower motor centres. Sometimes word-deafness if first and second gyri on the left side are involved.—*Region of the Basal Ganglia.* Hemiplegia from involvement of the internal capsule. Limited growth in either nucleus of the corpus striatum need not cause paralysis. Small tumors in the optic thalamus cause no symptoms, but, increasing, may cause hemianopsia and sometimes hemianæsthesia. Growths in this region are apt to cause early optic neuritis; by growing into the third ventricle, may cause distension of the lateral ventricles. Pressure symptoms from this cause and paralysis due to involvement of the internal capsule are the chief symptoms of tumor in and about these ganglia. Growths in the corpora quadragemina usually involve the crura cerebri and cause marked ocular symptoms. Loss of pupil reflex; nystagmus. Should the third nerve become involved, there will be motor oculi paralysis on one side and hemiplegia on the other.—*Pons and Medulla.* Pressure-symptoms. In disease of the pons the nerves may be involved alone or with the tract. In tuberculosis or syphilis a growth at the inferior and inner aspects of the crus may cause paralysis of the third nerve on one side, and of the face, hypoglossal and limbs on the opposite. A tumor growing in the lower part of the pons usually involves the sixth nerve, producing internal strabismus; the seventh nerve, producing facial paralysis; the auditory nerve, causing deafness. Conjugate deviation of the eyes to the side opposite that on which there is facial paralysis also occurs. Tumors of the medulla may involve the cranial nerves alone, or cause a combination of hemiplegia with paralysis of the nerves. There is usually difficult swallowing, irregular action of the heart, irregular respiration, vomiting, and

sometimes retraction of the head and neck, as signs of irritation in the ninth, tenth, and eleventh nerves. The gait may be unsteady or, if there is pressure on the cerebellum, ataxic. There may be numbness and tingling, and convulsions.

Diagnosis.—The diagnosis depends upon the gradual onset and the slow development of the case, with persistent and, usually, intense headache, choked disk, vertigo, vomiting, etc. The position of the tumor must of necessity be inferred from the focal symptoms. Several other conditions have one, or more, of these symptoms, but the totality of the symptoms indicating tumor appears reasonably clear. Thus *abscess of the brain* might easily be mistaken for tumor, but there is with it a history of trauma or the probability of septic infection; it has high and irregular fever, and choked disk is not present. Sclerosis has not the choked disk, and the disease lasts much longer. It is very difficult at times to differentiate *uræmia*, which has intense headache and neuro-retinitis and general paralysis, on account of the presence of Jacksonian epilepsy. Cases of *inflammatory softening of the brain* also might give trouble, but choked disk rarely occurs in connection with it and, unless rapidly developing, the symptoms are much milder than in tumor.

The **prognosis** is unfavorable, with the exception of gummata. In tubercular growths encapsulation may take place and life be prolonged for many years; but such cases are exceptional, and the pleasures of living may be marred by serious focal symptoms, as blindness. Sarcomatous growths prove fatal in from six to eighteen months. Gliomata may exist for years. The average duration of all cases is probably about three years. Death usually occurs from coma due to increasing intracranial pressure or sudden failure of respiration from involvement of the respiratory and circulatory centres when the growths are near the medulla.

Treatment.—Medical treatment is purely symptomatic; it aims chiefly to give relief from pain in the head and vomiting, and to meet pressing indications as they arise. Much may sometimes be done for the relief of pain by the exhibition of the "indicated remedy" (atropine is particularly useful); but after all, the help afforded amounts to little. Ice-bags are recommended for the headache, and the Paquelin cautery when the

pain is occipital, but I know of no permanent good accomplished by their use. In syphilitic cases large doses of iodide of potassium, continued daily for a long time, from six weeks to three months, have accomplished good results; hence the habit of "giving the patient the benefit of the doubt" by prescribing this drug even in cases where there is no reason to suspect syphilis.

"Brain-surgery" has been successful in a limited number of cases. To undertake a radical operation it is necessary to definitely determine the location of the growth and to ascertain, by exploratory operation, its accessibility. To obtain good results, operative measures should not be deferred too long. H. C. Wood is probably correct in estimating that removal of the tumor is practical in about three per cent. of the cases.

CHRONIC HYDROCEPHALUS.

A condition of the brain characterized by the accumulation of fluid in the ventricles. The term is also applied to the accumulation of fluid between the cortex and cranium (*hydrocephalus externus*; hydr. ex vacuo). It may be congenital or acquired.

Congenital or *infantile hydrocephalus* may occur in the foetus and thus obstruct labor. Several children in the same family may be afflicted. Its most striking sign is great enlargement of the head, particularly in the frontal and parietal regions. The bones of the skull become remarkably thin, almost as thin as paper, and nearly translucent. The sutures and fontanelles gape. The brain is atrophied, the hemispheres in severe cases possibly not exceeding an inch in thickness, the skull appearing like a bag containing fluid. The ventricles may be enormously dilated, chiefly the lateral, but often the third and fourth as well; their walls are more or less thickened and covered with minute granulations. The fluid of hydrocephalus is colorless, slightly albuminous, of a specific gravity of 1004 to 1006; the amount present varies from a pint to a quart, and often much more.

In other cases the child at birth shows no evidence of anything abnormal, but after some weeks enlargement of the head is noticed; this may proceed rapidly, sometimes symmetrically, again showing the greatest increase antero-posteriorly. The

fontanelles and sutures remain open; fluctuation may be distinct, and brain-murmur (Fisher) may be heard. The distended bluish veins underneath the scalp appear as a close net-work. Depression of the orbital plates of the frontal bone results in exophthalmos. The remarkable enlargement of the head and its prominence especially in the frontal region gives to the face the appearance of excessive smallness; the head often hangs forward, as though too heavy.

The mental condition of the child may be normal, but oftener there is enfeeblement and imbecility. There are motor disturbances, usually spastic symptoms, with exaggeration of reflexes; there is tardiness in learning to walk or inability to walk. The legs are more extensively involved than the arms; paraplegia is not infrequent. The sensations usually remain normal. Among motor irritations convulsions are the most prominent. There may be choked disk and optic-nerve atrophy. Exceptionally the disease is arrested and adult life is reached; in the overwhelming majority of cases death occurs within three or four years, usually from marasmus.

Acquired Chronic Hydrocephalus (Hydrocephalus of adults) is a very rare affection and may occur spontaneously, without a known lesion. It usually depends upon the presence of a tumor at the base of the brain or in the third ventricle; sometimes it is associated with closure of the communicating passage between the third and fourth ventricle or of Magendie's foramen, or it may, rarely, follow meningitis. In adults hydrocephalus may be extreme without causing expansion of the skull, but remarkable atrophy of the brain-substance then results. The symptoms are headache, ataxic gait, optic neuritis without focalizing symptoms and coma with slow pulse.

The diagnosis should present no difficulty in the congenital or infantile type, although exceptionally a rickety condition with thickening of the cranial bones may be mistaken for hydrocephalus. But in *rickets* the shape of the head is rather square, the fontanelles do not bulge, and, according to Starr, thickening of the cranial bones is associated with hypertrophy of the facial bones. In the chronic hydrocephalus of adults a positive diagnosis cannot be made.

Treatment.—The treatment of chronic hydrocephalus is wholly unsatisfactory. Recourse has been had to tapping

(safest done by puncturing the anterior fontanelle), but the relief obtained has been of short duration. Methodical compression is practiced by diachylon plaster, bringing it over the head in strips from front to back, from side to side, and diagonally. Care must be taken to produce even and not excessive pressure. Gray prefers the removal of a piece of bone, three to four inches long, an inch wide, on each side of the median line. Bartlett calls attention to the results obtained by Nicita, Locatelli, and others, from exposure of the child's occiput to the direct rays of the sun for, at first, twenty minutes each day, gradually increasing to thirty and forty minutes.

The remedies suggested by the totality of symptoms are SULPHUR, PSORINUM, and IODINE (ARSEN. IODAT., BARYTA IOD., CALCAREA IODAT., KALI HYDRIOD., MERCURIUS PROTOIOD.); their usefulness lies in their profound constitutional effects and in their close relation to such constitutional, inherited tendencies as are found in hydrocephalic children. If there is cause to suspect syphilitic taint, the IODIDE OF POTASSIUM, possibly THUJA, is to be particularly considered. APIS, BRYONIA, HELLEBORE, ZINC, and others, are indicated by symptoms described under "Tubercular Meningitis." If convulsions occur, they must be met by BELLADONNA, CUPRUM, or other symptomatically indicated remedy.

DISEASES OF THE SPINAL CORD.

GENERAL NOTES ON FOCAL LESIONS IN THE SPINAL CORD.

The following hints, after Ranney, will prove useful:

Focal Lesions in the Upper Cervical Region.—Hemiplegia results from affection of one lateral half of the cord only; paraplegia from a lesion extending transversely to both lateral halves of the cord. Both hemiplegia and paraplegia will be complete below the head, with, possibly, anæsthesia of the entire body. Dyspnœa and hiccough from involvement of the *phrenic nerve*; arrest of respiration is prevented through the action of the pneumogastric nerves and continued expansion

of the chest by the auxiliary muscles of respiration. In a surgical lesion, probable involvement of the *respiratory centre* of the *medulla*, with death from asphyxia; death from asphyxia not probable from paralysis of the phrenic nerves alone. Involvement of *cilio-spinal* centre in lower cervical region may cause irregularity of pupils and increase of temperature in face and neck. Irritation or pressure upon the *accelerating* centre of the heart causes irritation and irregularity of the pulse. Slowly developing, non-traumatic lesions in this region have shown hiccough (phrenic nerve), acceleration of the pulse (irritation of accelerating centre of heart) and dyspnœa (phrenic nerve or nucleus of pneumogastric nerve in medulla), with paresis of arms, then chest, then legs.

Focal Lesions of the Cervical Enlargement.—When there is irritation of the cilio-spinal centre, there is usually dilatation of the pupils, pallor of the face, acceleration of the heart's action; pressure upon or destruction of these centres usually causes contraction of the pupils, flushing of face and neck, slowing of the heart's action. When the lesion is situated *within* the *cervical* enlargement, there is gradual paralysis of arms and legs; generally sense of constriction around the chest ("cincture feeling"). Lesion at *upper* part of enlargement; motor and sensory symptoms in legs, trunk, and in nearly all the regions of upper extremities, including the parts supplied by the brachial plexus above the clavicle. "Cincture feeling" at level of clavicles; dyspnœa often excessive. If in the *lower* part of the cervical enlargement: loss of faradic reaction of the muscles supplied by the *ulnar* nerve, often with atrophy of these muscles, chiefly flexors of wrist and small muscles of the hand. "Cincture feeling" in upper part of chest. In severe cases paralytic condition of the muscles of the trunk (intercostals, triangularis sterni, accessory muscles of respiration) and of the abdominal muscles, embracing inspiration and expiration. Numbness, anæsthesia, paresis, or complete paralysis of lower limbs, in proportion to extent and severity of lesion. There may be paralytic condition of upper extremities. In surgical injuries to the upper portion of the cord, often decided elevation of the bodily temperature, with slowing of the heart's action.

Focal Lesions of the Mid-Dorsal Region of the Spinal Cord.—In the early stage, paresis of lower limbs and increased reflex

excitability (rigidity and stiffness of affected muscles when trying to stand or walk). Later, paralysis and contractures. Sometimes tonic and clonic contractions. "Cincture feeling" in region of navel or lower ribs, sometimes of axilla, usually at highest limit of the lesion. Often paralysis of bladder and rectum, which may yet, by the aid of reflex action, expel their contents. Early, patient can hardly get to closet in time to empty bladder or rectum; later, urine retained sufficiently to cause overflow and dribbling (demands use of catheter). Sexual function not necessarily impaired. Rarely atrophy of paralyzed muscles; electrical reaction normal or exaggerated. Paresis first felt in feet; gradually extends upward throughout lower limbs.

Focal Lesions Above the Lumbar Enlargement of the Spinal Cord.—Sensory and motor symptoms resemble those of lesions in mid-dorsal region, but the reflex spasms of paralyzed muscles are less violent; still, they are prominent, and indicate increased reflex excitability of the gray matter of the cord below the seat of the lesion. Bladder and rectum also affected as in lesions of dorsal region. Sexual power about normal. Constipation from paralysis of rectum. Micturition slow and interrupted from parietic vesical weakness, with, later, retention and overflow. In legs paralysis first noted in feet (sense of weakness and easy fatigue); numbness and anæsthesia extend as high as the groin or waist. "Cincture feeling" about waist below level of navel, at level of hips.

Focal Lesions of Lumbar Enlargement.—If in lower part of this enlargement, incomplete paralysis with marked involvement of muscles supplied by the sciatic nerve (feet, legs, posterior aspect of thighs, region of the nates). Bladder escapes mischief; paresis or paralysis of sphincter ani. Sense of numbness usually precedes the paralysis; if posterior column of cord be involved, complete anæsthesia of parts supplied with motor power by the sciatic nerve. Absence of reflex movements when there is sufficient destruction to lead to impairment of function; of paralyzed muscles if trophic function of cord be affected by changes in the ganglion cells of the gray matter. "Cincture feeling" usually about ankle, leg, or thigh.

Focal Lesions Confined to Lateral Half of Spinal Cord.—In case of localized lesion (hæmorrhage, fractured vertebra, con-

tusion, etc.) exclusively confined to one lateral half, there results "spinal hemiplegia" and "spinal hemi-paraplegia." Any lesion of a lateral half of the cord causes anæsthesia of the *opposite* side of the body, and motor symptoms on the *same side of the body as the lesion*. Lateral lesions and lesions affecting the entire cord are in their symptoms modified by the height of the lesion in the cord, for motor nerves and special centres in the cord itself are only affected when they lie below the seat of the lesion or are directly involved in the destructive process. When the seat of the focal lesion is high up in the substance of the cord, and the lesion is confined to a lateral half, the motor paralysis affects *one side only* of the body; the term "spinal" hemiplegia is then used to distinguish it from hemiplegia of cerebral origin. When the seat of the focal lesion is in the dorsal region, and affects one lateral half only, the resulting motor paralysis involves one-half of the same side of the body *below* the seat of the lesion; this is called hemi-paraplegia.

Spinal Hemiplegia.—To be complete, the lesion must involve one-half of the cord and must be in or above the cervical enlargement of the cord. The result then will be: motor paralysis in the arm and leg of the side of the body corresponding to the seat of the exciting lesion, and paralysis of the trunk on the same side (clinical experience shows that the intercostal muscles often escape); paralysis of sensation on the side of the body opposite to the seat of lesion; involvement of the cilio-spinal centre in the cervical cord causes, in addition, inability of the pupil to respond to light (it still acts in the accommodation of vision for near objects) and redness and increase of temperature of face, neck and ear of same side. There is also, from involvement of vaso-motor centres in the cord, elevation of temperature in the paralyzed muscles.

Hemi-Paraplegia.—The result of focal lesion involving one lateral half in the *dorsal* region, hence below the cervical enlargement and the location of the cilio-spinal centre. Consequently there is no paralysis of the upper extremities nor involvement of pupil, face, ear or neck. There is paralysis of the muscles *below* the point of lesion and on the side of the lesion, sometimes with hyperæsthesia of the integument on the paralyzed side; also, sensory paralysis below the point of lesion, on the side opposite of the lesion. Often the bladder and rectum

are paralyzed. The "band-like" feeling varies according to the seat of the lesion. The degree of reflex irritability or absence of muscular atrophy in the paralyzed parts depends upon the depth of the lesion in the cord and accompanying changes in the gray matter. There may be increase of temperature in the paralyzed limb. "Should the side affected with anæsthesia give any evidence of motor paralysis or muscular weakness or symptoms of anæsthesia appear upon the side where the motor paralysis is present, you may regard either one as conclusive evidence that the exciting lesion is progressing, and that the opposite lateral half of the cord is being involved to a greater or less extent."

REFLEXES.

Reflexes, to which frequent reference has been and will be made, are either superficial or deep. The *superficial* reflexes are excited by irritating the skin or mucous membrane by tickling, pricking, scratching or pinching the surface, or by the use of the electric wire-brush. The presence of the superficial reflex merely proves that the integrity of the particular nerve-arc implicated is intact; the absence of a superficial reflex proves absolutely nothing, for very many of them are inconstant or absent in persons who enjoy perfect health. The following are the most important superficial reflexes: The *plantar* reflex, contraction of the leg provoked by tickling the sole of the foot. The *gluteal* reflex, contracture of the gluteal muscles from stimulating the skin of the buttocks. The *cremaster* reflex, tickling of the inner side of the thigh causing the drawing-up of one testicle. The *abdominal* reflex, causing contraction of the rectus and other abdominal muscles by stroking the skin of the lower flanks downward. The *epigastric* reflex, causing dimpling of the epigastrium on the stimulation of the corresponding side of the chest in the fourth, fifth and sixth intercostal spaces. The *erector-spinal* reflex, causing contraction of the erector-spinae muscles by stimulating the skin along their periphery. The *scapular* reflex causing contraction of some, or all, of the scapular muscles by superficial irritation of the scapular region. The *palmar* reflex, causing contraction of the flexors of the fingers by tickling the palm of the hand. *Cranial* reflexes, as: contractions of the muscles of the palate by tickling the fauces,

or causing sneezing by tickling the nasal mucous membrane, or coughing by tickling the laryngeal mucous membrane, etc.

The most important *deep* reflexes are: The *knee-jerk* (Westphal's symptom, patella reflex). In testing this, the leg is so supported that the foot clears the floor and the patient is directed to let the leg hang perfectly limber and to close the eyes. The tendon above or below the patella is then sharply struck with the edge of the hand, finger, or small percussion-hammer. If the patient is directed to clinch the hand firmly at the time the blow is struck, the contraction will be "reinforced," i. e., increased. It is estimated that the knee-jerk is absent in about two per cent. of persons in a normal state.

The *ankle-clonus* (Achilles tendon reflex) is obtained by flexing the foot forcibly, so as to stretch the Achilles tendon. The calf-muscles contract and the foot is extended upon the leg; the muscles alternately and rapidly contract and yield while the pressure is maintained or until fatigued. The *jaw-reflex* is obtained by allowing the jaw to hang passively or by gently supporting it with one hand while with the other hand a sharp downward blow is struck on the chin with a percussion-hammer.

ACUTE SPINAL MENINGITIS.

An acute, non-syphilitic inflammation of the meninges of the spine. The terms *pachymeningitis* (internal or external) and *leptomeningitis* are used to describe inflammation of the dura mater or of the pia mater and arachnoid; clinically this distinction is of slight value, since nearly always all the spinal membranes are involved.

Ætiology.—The chief cause is infection (pneumonia, scarlet fever, typhoid fever, small-pox, etc.), but cases occur as the result of exposure to great heat or cold or from traumatism, including operations. Young males are especially liable to the disease. Pathologically the affection is identical with cerebral meningitis.

Symptoms.—The disease frequently begins with a hard rigor, followed by fever, nausea and vomiting, and, usually, slightly accelerated pulse. In some cases the fever is high and the arterial circulation greatly excited. Within a short time *pain* sets

in, which may be all along the spine or limited to the parts which stand in close relation to those segments of the cord which are nearest the seat of the meningeal inflammation. The pain is severe and constant, with acute exacerbations from movement of the spine, trunk, or limbs, and from pressure; the application of the electric current is unbearably painful. In a few hours motor symptoms develop in the form of violent tonic spasms, chiefly in the back, but also in the extremities; hence opisthotonos and vise-like flexion of the limbs. There may be convulsive twitchings, which are always exceedingly painful. The reflexes are highly exaggerated. Hyperæsthesia is usually pronounced, often with impairment of mobility of the hyperæsthetic parts; later anæsthetic patches may be scattered over the hyperæsthetic area. Focal lesions may be present, as frequent micturition or retention from involvement of the vesical centre, irregularity of the pupils from defective innervation of the cilio-spinal centre, profuse sweating from vaso-motor involvement, or bed-sores from trophic disturbances. Consciousness is usually not involved at first, but later on delirium and coma prevail, with death in from two to seven days from intense hyperpyrexia or paralysis of respiration and deglutition. In case of recovery there is nearly always left permanent contractions or paralysis, the result of injury to the roots of spinal nerves in the immediate neighborhood of the lesion.

The diagnosis depends chiefly upon the constancy and severity of the pain in the back, often shooting along the spinal nerves, muscular rigidity, highly exaggerated spinal reflexes, and high fever at the onset.

The prognosis is serious; as stated, recovery is rarely complete. The presence of symptoms indicating myelitis, great hyperpyrexia, and extension of the inflammation to the medulla, are very unfavorable.

Treatment.—Absolute rest in bed is not only essential, but is demanded by the patient; the diet, at first, should be light, later concentrated and highly nutritious. Among the “actively antiphlogistic” measures advised, active counter-irritation over the seat of the inflammation, as by actual cautery, and the use of cold or very hot applications are least harmful and may be actually useful. The direct application of ice to the head or neck is not advisable. When there is hyperpyrexia, the tepid

pack is more helpful than cold applications; luke-warm baths would answer as well, possibly better, were it not for the intense pain caused by moving the patient. The bladder must be guarded against cystitis. When there is incontinence, overflow, or retention, the catheter is to be used at regular and short intervals and the bladder washed out daily. Bed-sores develop easily; hence any irritation or abrasion of the skin demands careful attention. Frequent bathing of the skin in alcohol and constant care to have the bedding both soft (air-cushions) and perfectly smooth, with occasional change of the patient's position, will tend to prevent this very annoying complication. When bed-sores do occur, they are to be treated according to recognized surgical principles, including the permanent water-bath.

ACONITE and VERATRUM VIRIDE are both useful in the early stage, but in the early stage only; VERATRUM is called for when the arterial tension is very great. BELLADONNA and GLONOINE usually follow, especially so when there is marked congestion and convulsions early in the disease. GELSEMIUM has much less violent congestion, but is very useful when there is pain in the back of the neck, extending to the shoulders and spine, trembling weakness, paralytic condition of extremities, paralytic weakness of the bladder, etc. The patient has control of his mental faculties, but, unless the pain is intense, he may lose himself in a stupid sleep, with low muttering delirium. BRYONIA is an excellent remedy, largely on account of its close relation to the serous membrane; the characteristic indications are easily recognized. CICUTA VIROSA is probably the most important remedy after the first stage has passed; it practically covers all the manifestations of motor irritability which are likely to occur, including marked tetanic rigidity (opisthotonos) and violent convulsions. Insensibility, with staring eyes, red, hot face, strabismus, difficult breathing, etc., may be present. Consult also APIS, CUPRUM, and other remedies under Simple and Tubercular Meningitis. The various paralyses likely to remain after recovery demand NUX VOM., STRYCHNIA, CAUSTICUM, RHUS and SULPHUR; massage and *mild* currents of electricity must be applied to the atrophied muscles.

CHRONIC SPINAL MENINGITIS.

General Chronic Spinal Meningitis may follow acute spinal meningitis or occur in connection with syphilis or alcoholism; it is comparatively rare. The symptoms suggest those of the acute form, but they are rather moderate as to severity and slow in development. The pain in the back and limbs is dull and aching, but has the characteristic exaggeration from motion and pressure; there may be soreness, itching and burning of the limbs; hyperæsthesia, muscular contractions and partial paralysis of the legs are common; the reflexes are increased; involvement of the intestinal, vesical and sexual centres gives rise to incontinence of urine and fæces or constipation, and to impotency or priapism; there may be bed-sores; the presence of the "cincture feeling" indicates the height of the lesion.

The most important form of *Localized Chronic Spinal Meningitis* is the form first described by Charcot as *pachymeningitis cervicalis hypertrophica*. Anatomically it consists of extensive thickening of the dura mater in the cervical region, the dura appearing as though composed of concentric layers; the hypertrophy consists of a dense growth of connective tissue. The effects of these anatomical changes first involve the penetrating nerve roots, then the spinal cord, which undergoes mechanical compression, eventually resulting in secondary degeneration of the motor nerves and muscles and of the pyramidal tract in the cord. There is at first severe pain, shooting from the neck into the occiput and arms and hands (from irritation of the posterior nerve roots), continuing from two to three months; gradually atrophic paralysis of the upper extremities develops, chiefly affecting the parts supplied by the ulnar and median nerves, and causing contractions which give to the hand a peculiar and characteristic "claw-like" appearance. Advancing compression of the cord results in spastic paralysis of the lower extremities, with increase of tendon reflexes and without muscular atrophy. Finally there may be anæsthesia of the lower extremities, paralysis of the bladder, bed-sores, and death; partial recovery is possible.

Treatment of chronic spinal meningitis consists of the exhibition of remedies suggested by careful study of the symptoms of the case (see Simple Meningitis, Tubercular Meningitis,

Acute Spinal Meningitis), with preference for those which are capable of producing a profound constitutional effect. Syphilitic cases may require potassium iodide and mercury. The persistent use of counter-irritation is of doubtful benefit. Absolute rest is indispensable; means of supporting the strength of the patient and of putting him in the most favorable surroundings are important.

AFFECTIONS OF THE BLOOD-VESSELS OF THE

~~SKIN.~~ *Spine. (See page 572)*

Congestion.—Practically nothing is known of hyperæmia of the cord, from an anatomical or clinical aspect. It has been thought possible that neurasthenia is really the result of spinal hyperæmia, and that in certain cases of excessive exertion, exposure, etc., with symptoms of threatening paralysis and lessening of reflex activity, but stopping short of actual paralysis, spinal congestion is the responsible cause. It is pointed out that excessive functional activity of the cord is accompanied by congestion, as shown in cases where immoderate sexual indulgence is known to have been followed by hæmorrhage into the cord.

Anæmia.—Equally little is known of spinal anæmia. The experiments of Herter have shown that in spinal anæmia, artificially produced by ligating the aorta, paraplegia is soon developed. This explains why paraplegia so often follows profuse hæmorrhage, especially from the uterus or stomach.

Embolism and Thrombosis.—The former is rare; it has been found associated with choreiform movements. Thrombosis of the smaller vessels is frequent and is clearly connected, here as elsewhere, with endarteritis.

Endarteritis.—This consists of the nodular peri-arteritis or endarteritis associated with syphilitic disease or an endarteritis obliterans, with great thickening of the intima and narrowing of the lumen of the vessels, usually affecting the larger vessels.

Hæmorrhage into the Spinal Cord (Hæmatomyelia).—Hæmorrhage into the cord usually results from cold, exposure, over-exertion and, chiefly, traumatism. It has been noticed in connection with tetanus, convulsions, and accidents associated

with rapid asphyxia. Tumors, syringomyelia and myelitis rarely cause it. Hæmorrhage which is secondary to inflammation or blood-disease is not included here. Hæmatomyelia is rarely recognized during life.

Morbid Anatomy.—The cord is usually enlarged at the site of the hæmorrhage. The extravasation is most marked in the gray matter, and may be focal, limited or diffuse. The white matter may be torn, with blood escaping beneath the meninges.

Symptoms.—The onset is extremely sudden. A brief loss of consciousness or a sharp pain in the extremities is followed by paralysis of both arms and legs when the seat of the hæmorrhage is in the cervical region, of the lower half of the body when the bleeding is in the dorsal or lumbar region. The motor paralysis at once occupies its whole field and does not extend upward. The bladder and rectum are involved at once. There may be loss of sensory function corresponding to the loss of motor power. Myelitis frequently follows, with fever, loss of reflexes and decubitus. Spinal hæmorrhage is nearly always rapidly fatal; exceptionally recovery has taken place, with symptoms of permanent partial paralysis.

ACUTE AFFECTIONS OF THE SPINAL CORD.

ACUTE MYELITIS.

Ætiology.—Acute inflammation of the substance of the spinal cord is a disease of early and middle life, and occurs oftener in men than in women. Its causes are: Exposure to cold, especially after overheating; soldiers during a winter campaign, after a long day's march sleeping on the wet ground or snow, are liable to the disease. Great exertion, leading to rapid loss of power; some authorities claim that excessive sexual indulgence, especially unnatural, belongs here. Traumatism, as fracture of the spine or injury from intense muscular effort. Disease of the vertebræ (caries, cancer). Infectious diseases (typhus, small-pox). Disease of the cord itself, as tumors or syphilis. Certain poisons, as phosphorus, arsenic lead, alcohol.

Morbid Anatomy.—The changes which can be observed with the naked eye consist of softening and coloring of the cord.

The former may be felt even before the membranes are opened; it varies in degree, and in extreme cases follows the escape of the broken-down matter as a pultaceous fluid. In cases not so far advanced, the sharp distinction between white and gray matter is lost, the softened areas gradually shading into normal tissue. When the softening is most marked in the gray matter, it is called *central* myelitis; when the entire segment is involved transversely, it is known as *transverse* myelitis; when it is disseminated and there are foci of softened tissue here and there, the term *insular* or *disseminated* myelitis is applied. The dorsal portion of the cord shows these changes most extensively. The reddish or brownish coloring of the softened cord ("*red softening*") is due to the effusion of blood from ruptured capillaries or larger vessels; sometimes blood-clots are found (*hæmorrhagic myelitis*). Histologically "the multipolar cells become irregularly swollen, with their processes broken and shrunken, their structure coarsely granular, or in later stages formless, finally broken up into débris. The nerve filaments first enlarge, with their axis-cylinders especially thickened; then they become moniliform, and finally they break up. In the end the myelitic tissue consists of débris, with remains of nerve-cells and filaments mixed with drops and masses of myelin, large granular corpuscles, pigmented granules, altered blood corpuscles, etc. *Gray myelitis*, so-called, is that condition in which there has been an attempt at recovery, with absorption of débris, and the formation of connective tissue passing into sclerosis. Under no circumstances is there any repair of damaged nerve-filaments." (H. C. Wood.)

Symptoms.—Symptoms of *motor irritation* occur early and persist throughout the course of the disease. They consist of twitching of paretic or paralyzed muscles, first in the legs; ataxic movements are comparatively rare, and when they occur are most frequent in the upper extremities. *Motor paralysis* is first indicated by increasing weakness in the legs, culminating in complete loss of function, loss of motor power in the arms developing in the same manner. In transverse myelitis the paralysis involves both halves of the body; when the seat of the lesion is in the dorsal or lumbar portion of the cord, the upper extremities are not implicated. Involvement of the upper extremities and brachial paraplegia proves the existence

of a cervical myelitis. *Sensory disturbances* at the onset are mild, and consist chiefly of formication and numbness with, often, very slight loss of sensibility; later, there is loss of sensitiveness of the skin, analgesia and finally, often, complete anæsthesia. In some cases marked hyperæsthesia exists to painful stimuli, as the prick of a pin. The sensory disturbances afford valuable aid in estimating the height of the lesion in the cord, which is at about the level of the line of normal sensibility in the trunk; thus, when the seat of the lesion is in the lumbar region, the line of normal sensibility is at the height of the navel or slightly above it; when in the lower dorsal region, at the lower end of the sternum; when in the upper dorsal, at the level of the axillæ; when in the cervical region, the upper extremities are involved and, rarely, anæsthesia may be complete. The *cutaneous reflexes* are diminished or lost in the lower extremities from extensive myelitis in the lumbar region. In dorsal and cervical myelitis the cutaneous reflexes are left intact even when there is anæsthesia, or they may be increased; exceptionally there is impairment of cutaneous reflexes from loss of irritability in the conducting fibres or from irritation of the reflex inhibitory fibres. The cremaster reflex is lost in myelitis of the upper lumbar region. *Tendon* reflexes are increased during the state of irritation and lost after paralysis has become complete. Loss of these reflexes in the lower extremities indicates lumbar myelitis. When the cervical or dorsal region are the seat of the lesion, there may be increase of tendon reflexes in the lower extremities. When the cervical region is involved, there may be increase of tendon reflexes in the upper extremities. Disturbances in the *bladder* and *rectum* are characteristic, and occur regardless of the seat of the lesion. More or less difficulty in urinating, with straining, is followed by retention of urine from paralysis of the detrusor urinæ and, later, of the sphincter vesicæ, with incontinence. Hence the tendency in myelitis to the development of cystitis, which in turn may give rise to pyelitis and purulent pyelo-nephritis. *Constipation* is common at first; it depends upon weakened peristalsis and paresis of the abdominal muscles, and may be excessive. Incontinence of fæces may eventually result from paralysis of the sphincter ani. When there is increased reflex irritability, irritation of the skin over the thighs, perinæum, gluteal region, etc.,

may cause involuntary contractions of the bladder and expulsion of urine.

Trophic disturbances are pronounced. Muscular atrophy appears early, with loss of electrical irritability and the reaction of degeneration. Often the muscles merely become flabby, show only slight wasting and, later, rigidity without reaction of degeneration; this applies particularly to myelitis below the cervical and dorsal regions. There often are trophic disturbances in the skin, which is dry, harsh, scaly, and occasionally covered with herpetic eruptions. Vaso-motor disturbances give rise to a mottled, cyanotic appearance of the paralyzed extremities. There may also be slight œdema. The paralyzed parts may be cold and dry, or constantly moist with sweat. Acute decubitus or trophic bed-sore is common; it usually appears in the sacrogluteal region, much less frequently at the heels or other parts of the body. The skin at first presents dark erythematous patches, on which vesicles or bullæ form within one or two days. Usually the epidermis drops off, exposing an angry looking surface with dark, bluish patches and bloody infiltration of surrounding tissue, rapidly forming a slough which may involve an extensive area and destroy all the tissues down to the bone.

The seat of the lesion may be approximated if the following are borne in mind: *Cervical myelitis*: Paralysis usually complete below the seat of the lesion; rarely the arms only affected (cervical paraplegia). Paralysis of the upper extremities, sometimes without involving the muscles of the shoulder. Gradual loss of sensation. Sometimes atrophy of single muscular regions of the arm. Slight atrophy of muscles of the legs. Increased tendon reflexes and spastic symptoms in the legs, sometimes in the arms. Normal, sometimes increased, cutaneous reflexes in the legs. Often pupillary changes, vomiting, hiccough, great slowing of the pulse; sometimes dyspnoea and dysphagia. *Dorsal myelitis*: Upper extremities normal. Motor, later sensory, paraplegia, without degenerative atrophy. Increased tendon reflexes; cutaneous reflexes normal, rarely increased. *Lumbar myelitis*: Upper extremities normal. Motor, later sensory, paraplegia; sometimes with degenerative atrophy. Impairment or absence of cutaneous and tendon reflexes.

Disturbances of the bladder and rectum are present in all forms, regardless of the seat of the lesion.

The *course* of acute myelitis varies greatly. In *central* myelitis (explosive or foudroyant myelitis) the onset is sudden, almost as abrupt as hæmorrhage, with high fever, sometimes delirium, convulsions and coma; in this form the course of the disease may be exceedingly rapid, complete paralysis, with trophic changes and abolition of all the reflexes, developing within a few hours, and death occurring in a short time, often without violent constitutional symptoms. If death does not take place within a short time (asphyxia), it usually results in two or three weeks from paralytic cystitis or acute decubitus. In the *acute* form the paralysis appears in one or two weeks. There may be fever, headache and delirium. Death commonly results from exhaustion or septic fever; recovery may take place, but is nearly always imperfect. In the *subacute* form the course is slow and somewhat indefinite; the development of paralysis is tardy and incomplete; it usually terminates in chronic myelitis or in imperfect recovery with paralysis and atrophy in groups of muscles.

MYELITIS OF THE ANTERIOR HORNS.

(Polio-Myelitis Anterior.—Atrophic Spinal Paralysis.)

An acute affection, found chiefly in young children, but also in adults, characterized by inflammation or degeneration of the ganglionic cells in the anterior horns of the spinal cord, fever, loss of power, and rapidly developing atrophy of the affected muscles. It is also described as Infantile Paralysis and Essential Paralysis of Infants.

Ætiology —Nothing positive is known concerning the causation of this disease. Five-sixths of all the cases occur during the first ten years of life, and a majority of these during the first three years. Boys are oftener affected than girls, and more cases are observed in the summer than in the winter. Hereditary influences are of no importance. It is probable that exposure to cold and over-exertion are more frequently the cause than other conditions. It has not yet been determined to what extent traumatism is responsible for the occurrence of individual cases, but it is generally held of slight importance. Irritation from dentition, according to Louis Starr, is merely incidental. Epidemics have been observed in Europe and in America.

Morbid Anatomy.—The cervical and lumbar enlargements are the favorite seat of the affection. The disease is probably of arterial origin; according to Marie, embolism or thrombosis of the arteries of the anterior cornua. Inflammatory or hæmorrhagic processes in the anterior horns result in softening and disintegration, with complete or nearly complete destruction of the large motor and trophic cells. Later, atrophy of the affected half of the cord, with granular disintegration of the involved nerve elements. There is sometimes descending degeneration in the antero-lateral column, with atrophy of corresponding nerve-roots and rapid wasting of muscles which depend for innervation upon the affected cells in the horn. The peripheral nerves arising from the affected horns may be extensively degenerated, but usually many normal elements are seen upon cross-section. Examination of the brain is nearly always negative. In some cases of long standing the corresponding cortical motor area has been found smaller or undeveloped.

Symptoms.—The onset of the disease usually is gradual. There may be fever, for a few hours or several days, with a temperature ranging from 101° to 103°, sometimes with vomiting, diarrhœa, delirium, and general convulsions. In some cases the child may retire in usual health and awaken paralyzed in the morning. After the initial period has passed, the paralysis is generally noticed. It usually reaches its maximum within twenty-four or thirty-six hours, sometimes in less time, and rarely requires more than three to five days. It is nearly always localized. Sensation appears normal; pain is thought to be rarely experienced in the affected muscles; however, not infrequently the handling of the affected member elicits from the child outcries, and older persons state that they suffer at this stage from both pain and formication. The distribution of the paralysis varies, but hardly ever remains as extensive as at first, some muscles recovering while others are permanently disabled. The face is practically exempt; the intercostal muscles and those of the diaphragm are hardly ever affected, a fact which explains the rarely fatal issue of the disease. With the establishment of the paralysis the fever and other constitutional symptoms pass away, and the patient appears in excellent condition, eating heartily and resting comfortably.

For some weeks following, an improvement occurs in the ex-

tent of the paralysis, groups of muscles gradually recovering their tone; exceptionally complete recovery takes place. All the affected muscles show waste and great diminution, if not loss, of faradic excitability. Usually, however, with marked improvement in some directions, certain muscles or groups of muscles refuse to recuperate, and in them paralysis becomes permanent. The permanently disabled muscles become extremely flaccid and soon show evidence of pronounced atrophy, which eventually becomes extreme. This atrophy is purely degenerative; hence the reaction of degeneration is present. This consists of the following phenomena: Within two or three days after the onset of a paralysis there is an increasing loss of faradic and galvanic excitability in the nerve, which is completely lost after one or two weeks, so that muscular contraction can be no longer provoked by electric currents acting upon the nerve. At the same time the muscle itself has lost its power to respond to the faradic current, while after a temporary diminution of sensitiveness to the galvanic current an increased sensitiveness of galvanic muscular excitability develops during the second week, so that weak galvanic currents applied to the muscle produce strong muscular contractions. These muscular contractions, excited by the galvanic current, are peculiar in that they are abnormally slow, lingering, protracted, "worm-like" and may persist during the entire duration of the closure of the current. Furthermore, they occur not only chiefly at the cathodic closure, as they normally do, but at the anodic closure as well, and sometimes are even more marked at the latter. Often the mechanical irritability of the muscles is increased. This condition of increased galvanic muscular excitability lasts from four to eight weeks, when, in long-continued or incurable cases, it gradually passes away, so that eventually in incurable cases the strongest current will only produce a scarcely perceptible slow anodic closure contraction, and finally no contraction at all. The trophic changes extend also to the bones of the affected side or area, which become stunted in growth and, in the long bones, materially shortened. The skin may show trophic disturbances; it may feel cool and appear of a cyanotic color. The tendon reflexes are lost in the paralyzed limbs; the cutaneous reflexes usually are absent; cutaneous sensibility is normal. Eventually the atrophied muscles may become mere fibrinous

bands, and from their absolute inability to perform any of the functions of muscular structure, resulting in their complete relaxation and in consequent separation of the articular surfaces of joints, serious deformities of joints may occur. Contractions in the paralyzed part are, however, more frequent. Thus, the paralytic club-foot (*talipes varo-equinus*) and flexed thigh or knee are common. Great deformities arise from the contractions of unparalyzed antagonists in the arm and spinal column. The distribution of permanently paralyzed muscles is based upon no known law. The muscles of the face escape, save in very rare cases. The legs are affected about three times as often as the arms, and the left leg is involved oftener than the right. Rarely both limbs on the same side are paralyzed; frequently it is one arm and the leg on the opposite side. In the arm there is more often wasting of the small muscles of the hand, the extensors of the wrist, and the deltoid.

There is also described an *acute or subacute polio-myelitis of adults* which closely resembles both anterior polio-myelitis of children and multiple neuritis, presenting abruptness of onset, rapidly developing atrophy, and reaction of degeneration. It is unlike infantile paralysis in its continuously progressive course, i. e., there is no period of regression. It may begin in the lower extremities and extend upward, in which case death may occur from involvement of the muscles of respiration and deglutition. Most cases recover with permanent impairment of the muscles.

Diagnosis.—This at the onset of the disease often is difficult, if not impossible. The symptoms, however, soon become unmistakable; the occurrence of the affection in young children, the course of the paralysis and the marked trophic disturbances distinguish it from *Landry's paralysis*, while the absence of nerve pain with great tenderness, the completeness of the paralysis, and the presence of the reaction of degeneration establish the differentiation from *peripheral neuritis*. *Cerebral palsy of children* is ushered in by convulsions, but they involve one side or one limb, or the face, while the convulsions of infantile paralysis are general.

Prognosis.—The prognosis, as to life, is very favorable; exceptionally death may occur at the very onset of an unusually severe case; this passed, danger to life is ended. It is further-

more safe to promise that a marked improvement will occur in the case as compared with the paralysis when first noticed. To determine the probable extent of this improvement, repeated and careful examinations of the susceptibility of the muscles to the faradic current must be made; any response, even though slight, is favorable so far as it concerns the muscles tested. The certainty of permanent paralysis in nearly all cases and the probability of secondary contractures must not only be borne in mind by the physician but, as a measure of self-protection, should be stated to the friends. If in case of paralysis of six months' standing intelligent treatment does not cause improvement in from four to six months, the case is hopeless.

Treatment of Acute Myelitis and Infantile Paralysis.—In the treatment of myelitis *absolute rest* is of the greatest importance; absolute cleanliness also is imperative. Incessant care must be exercised to avoid bed-sores and cystitis. To accomplish the former, pressure of any sort, no matter how trivial, must be rendered impossible. The bed-clothing, sheets, etc., must be kept perfectly smooth at any expense of trouble on part of the nurse; a water-bed is highly desirable and should be procured, if possible. Frequent bathing of the lower back and hips in alcohol is advisable; solutions of tannin and alum answer the same purpose. As soon as the skin breaks, the sore must be treated upon sound surgical principles. Danger of cystitis may be averted by the systematic use of the catheter, aided by washing out the bladder once in twenty-four hours with an antiseptic solution. Incontinence demands continuous catheterization. Spitzka suggests that the retention of the catheter be secured by passing it through a perforated condom which may be fastened to the inguinal region; to the catheter should be attached a tube of soft rubber which ends in a urinal.

Venesection, the persistent use of cold (ice-bags), of the hot bath or hot pack (Erb), and counter-irritation by the actual cautery or blisters have all been recommended and in turn discarded as barbarous and worse than useless. Chapman's ice-bag to the spine is still used.

In due time massage, applied persistently and by skilled hands, should be employed to help the wasted muscles recover nutrition and tone. Electricity must never be used early, and, according to Osler, accomplishes nothing when there is trans-

verse myelitis in the dorsal region with retention of nutrition in the muscles of the leg. Spinal galvanization, continuous and sharply interrupted currents, and direct application to the affected muscles, are recommended by Rockwell.

Infantile Paralysis.—If seen in the febrile stage, the child must be quietly kept in bed and under the action of such remedies as are symptomatically indicated. Blisters and counter-irritation of any kind are to be avoided. As soon as the condition of the child permits, it must be taken out of doors daily, living in the open air as much as possible. The chief indication is to maintain nutrition of the affected muscles. To this end massage is invaluable. When that cannot be applied by skillful hands, frequently repeated inunctions with olive oil or cod-liver oil, followed by brisk rubbing of the parts, is exceedingly helpful and should be maintained indefinitely, for at least many months daily. Electricity may be used to advantage, provided the task is not left to an ignorant nurse or to members of the patient's family. A very light faradic current may be applied to muscles that respond, or the galvanic current may be used, the poles being so placed that the muscle throughout its entire length is inclosed between them. It is well to have the current slowly interrupted or, still better, to have the current reversed, so as to make alternating "to and fro" currents. The use of electricity should not be begun too soon, but must be persevered in for at least three months; many muscles which at first do not respond, do respond later. "Its usefulness consists in maintaining the nourishment and normal contractility of the muscles which are temporarily deprived of their natural trophic and motor control, so that, as the inflammation subsides and the widespread inhibitory effect of the local lesion recedes, the apparatus may find the muscular periphery in the most favorable state to respond to its enfeebled influence." (Starr.) Contractures must be carefully looked after. Exercise of the endangered parts is to be systematically maintained. Section of the tendon may afford much relief, and when performed should be followed by the renewed use of electricity in affected muscles. Experience has shown that the operation often at once improves the nutrition of the muscles; hence the wisdom of again using electric stimulation in order to aid to the fullest extent possible this recuperative effort.

Therapeutics.—The sphere of ACONITE, BELLADONNA and GELSEMIUM in the initial stage is well defined by the characteristic concomitants.—ACONITE, in addition to fever, has very painful anæsthesia, numbness in the hands and back, and formications.—BELLADONNA has tonic and clonic spasms, paralysis of the iris and muscles of the eye.—GELSEMIUM is indicated by the general paretic weakness, especially of the muscles of voluntary motion; incontinence of urine; paretic weakness of the tongue and glottis; soreness of the muscles. Confused feeling in the head. Infantile paralysis.—MERCURY has been prescribed empirically and has the indorsement of many of the older homœopaths, especially of the German school. Its profound action upon the nervous system, causing in the healthy neuralgic pains, spasmodic contractions, tremors and paralysees, speak strongly in its favor as a great remedy in serious lesions of the nervous system. Hart recommends it when there are violent pains in the spine, worse from motion; paralysis and anæsthesia of the lower extremities; jerkings in the paralyzed muscles; paralysis of bladder and rectum; great restlessness and sleeplessness at night. Farrington states that it follows well after BELLADONNA, especially in meningeal inflammation, with hasty speech and quick nervous talking, but does not mention it under myelitis.—PHOSPHORUS. In connection with caries of the vertebræ, with thin, offensive discharge; in persons who are exhausted from sexual excesses and a “wearing” mode of living; numbness and insensibility of the extremities; burning pain in the spine; cincture feeling.—NUX VOMICA. Numbness and formication along the spine; sharp, lancinating pains along the spinal nerves; tonic rigidity; paralysis of the legs; “cincture feeling” about the waist. Strychnia, in light physiological doses (gr. $\frac{1}{60}$ to $\frac{1}{100}$), three times daily, in cases that have a tendency to become chronic.—RHUS TOXICODENDRON is useful in infantile paralysis from exposure, as lying on the damp ground or from over-exertion.—DULCAMARA, in myelitis from exposure to wet, with paralysis of the lower extremities.—CAUSTICUM. Numbness, insensibility and paralytic weakness, with trembling from motion. Shifting, tearing pains in the extremities. Paralysis of hand and arms; contractures. Tendency to soreness in the folds of the skin. Paralytic weakness of the vesical sphincter; paralysis of the bladder; reten-

tion of urine.—*SECALE CORNUTUM*. Paralysis of the extremities, with cramp, numbness and formication. Anæsthesia of the limbs. Tingling in the back, extending to fingers and toes; contractions of flexor muscles; paralysis of bladder and rectum.—*ANACARDIUM*. Great debility; weariness, with restlessness; paralysis of single parts; sensation as of a band around the body. Consult also *ARSENICUM*, *OPIUM*, *PHYSOSTIGMA*, *ZINCUM*, *OXALIC ACID* and the remedies considered under meningitis.

ACUTE ASCENDING (LANDRY'S) PARALYSIS.

An acute disease of unknown pathology, characterized by paralysis beginning in the lower extremities, ascending rapidly to the muscles of the trunk and arms, finally involving the muscles of respiration, deglutition and articulation, not accompanied with trophic changes or changes in the electro-excitability of the muscles.

Ætiology.—The disease usually occurs in males from the twentieth to the thirty-fifth year. It may follow specific fevers, sometimes excessive exposure. Its pathology is unknown, no corresponding lesion having been found in the few cases studied.

Symptoms.—The onset may be sudden, or there may be for several days general indisposition, feverishness, headache, loss of appetite and dragging, tearing pains in the back and extremities. The initial symptom of the paralysis proper is a sensation of numbness in the legs, with rapidly increasing weakness which in a few hours may terminate in complete motor paralysis. The muscles of the trunk are involved after those of the legs; then the arms, neck, and the muscles of respiration, deglutition, and articulation, death usually occurring from failure of respiration within two or three days or, in protracted cases, within one or two weeks.

The muscles remain flaccid, and passive motion is easy and painless; there is no atrophy of muscular tissue nor are there constant or striking changes in the muscular electrical excitability. The reflexes may be diminished or lost; in some cases they appear almost normal. Sensory symptoms are variable and of a mild character. They consist of tingling and numbness, hyperæsthesia or anæsthesia. Sensation may be delayed. The

sphincters are rarely affected, save, exceptionally, late in the disease. Sometimes the legs are slightly œdematous. Copious sweating has been observed in some cases. Usually there is absence of fever, but in the early stage the temperature may rise to 103° or even 104°; if so, it later nearly always drops to normal. Moderate enlargement of the spleen, less often of the lymphatic gland, and slight albuminuria have been observed in some cases.

The *course* of the disease is rapid. Death sometimes occurs within twenty-four to thirty-six hours; the duration of the affection rarely exceeds two weeks.

The prognosis is grave, probably hopeless in the majority of cases. Recoveries, however, occur when the paralysis does not extend to the respiratory centres or when it appears incomplete; in such cases gradual improvement may occur, the muscles first attacked being the last to recover. Recovery is rarely complete.

The diagnosis is not difficult, since the symptoms are striking.

The rapid course of the disease, the absence, usually, of fever, and always of marked trophic changes, with the normal response of the muscles to electrical stimulation and the functional integrity of the sphincters, render the clinical picture very clear. When sensory disturbances are exceptionally marked, the disease may so closely resemble multiple neuritis as to render differentiation impossible.

The treatment consists of absolute rest in bed, appropriate and nourishing diet, and the exhibition of the symptomatically indicated remedy. ACONITE, GELSEMIUM, GRINDELIA, RHUS, CONIUM, PHOSPHORUS, NUX VOMICA, ZINCUM and ARSENICUM should be carefully studied. In due time massage and electricity will prove of service.

CHRONIC DISEASES OF THE SPINAL CORD.

SPASTIC PARAPLEGIA.

A disease which is the result of sclerosis of the antero-lateral columns of the spinal cord, and which is characterized by loss of power, with spasm, of the muscles of the lower extremities, with exaggerated reflexes and without pronounced sensory disturbances or trophic changes. It is also described as *Lateral*

(or antero-lateral) *Sclerosis* and *Spastic Spinal Paralysis*. The essential clinical feature: *loss of power associated with spasm*, is found under conditions which differ ætiologically and anatomically; hence, various forms are recognized. Of these the most important is:

Syphilitic Spastic Paralysis (Erb).—This occurs chiefly in male adults, usually at middle age, with a history of syphilis. Cases, however, have been observed with scarcely perceptible variation of symptoms when no data establishing a syphilitic history could be obtained; here belong cases due to exposure or attributed to sexual excesses, and occasionally to poisoning, chiefly by lead. Anatomically there is lateral sclerosis affecting the crossed pyramidal tract which contains the fibres that connect the spinal motor cells with the cerebral ganglia.

Symptoms.—The first intimation of trouble consists of weakness and stiffness in the legs, occasionally with pain in the back or in the calves of the legs, which may show itself in more or less severe clonic or tonic spasms in the legs at night, especially after unusual fatigue, such as walking a long distance. Gradually there develops the so-called “spastic gait.” The increasing loss of power necessitates a conscious and increasing effort to move the leg forward and to raise it; hence the forward movement is slow and hesitating, while the toes drag and catch the ground, the body always inclining toward the leg upon which it rests while the other is being laboriously put forward. The spastic element is shown in the rigidity of the muscles which, with the loss of power in them, greatly shortens the steps and may cause trembling and rhythmical movements in the legs during and after walking, throwing the heels up and down, or preventing the natural spreading apart of the legs, so the knees are kept close together; spasm of the adductors may result in sudden and violent crossing of the legs. In some cases the exaggeration of the reflexes makes itself felt in walking, clonus developing whenever the ball of the foot rests upon the ground. As the case advances, the position of the patient in walking becomes more and more insecure; when the heel becomes permanently drawn up, throwing the body forward, with its weight resting upon the toes, the use of canes, crutches and other assistance becomes indispensable. Finally the legs prove utterly useless, and the patient is forced to remain in the

recumbent position. The legs at first are reasonably supple and allow passive motion, but later the development of the exaggeration of reflexes makes even passive motion increasingly difficult. Eventually the patient lies with the legs extended, rigid, or flexed upon the thigh, with feet inverted, sometimes crossed. Nutrition of the affected muscle is perfect. As stated, both deep and superficial reflexes are highly exaggerated. In some cases this is so marked that violent clonic spasms are caused from slight touch (*spinal epilepsy of Brown-Sequard*). The electrical reactions of the muscles are normal. In the late stage the muscular rigidity may be so great that no reflexes can be obtained. Sensory disturbances are trifling. There are no trophic disturbances in the joints, nor is there any loss of power in the bladder, rectum, or in the sexual function, save when the disease is far advanced. In some instances rigidity of the arms develops late.

The *course* of the affection is steadily downward, but its progress is very slow, and life may not be materially shortened.

The diagnosis is easy.

Other forms of spastic paraplegia are: *Secondary Spastic Paralysis*, occurring as a feature of a transverse lesion of the cord in chronic myelitis, the result of slow compression (caries), pressure (tumor), or multiple sclerosis. The degree of paralysis varies; it is more liable to be complete in compression-myelitis, in fracture or in caries. Flaccidity of the limbs without increase in the reflexes in cases due to compression has been noted by French observers. *Spastic Paraplegia of Infants* (Heine's *Paraplegia cerebri spastica*) is practically a birth-palsy (result of difficult labor), and may be due to bilateral meningeal hæmorrhage or arrested development of the pyramidal tracts. Cerebral defects (imbecility, idiocy, nystagmus) are not uncommon. The disease is noticed when making the toilet of the child or when the infant attempts to stand or walk. Talipes equinus is frequent. Dragging of the toes and cross-legged progression are observed. The ankle-clonus is rarely obtained. Otherwise the symptoms are those of the affection in adults. A *hereditary* form has been described, the disease occurring in several members of the same family, appearing either in infancy or at, or after, middle age. If the former, there is evidence of a primary cerebral lesion (mental

enfeeblement, atrophy of the optic nerve, difficult speech); in adults the symptoms are purely of spinal origin.

Ataxic paraplegia, first described by Gowers, involves both the posterior and lateral columns. It is seen in middle life, oftener in men than in women, and is thought to be the result of cold, trauma, sexual excess and, very rarely, of syphilis. The symptoms combine the characteristics of spastic paraplegia and tabes, save that the sensory symptoms of tabes are not present. There is progressive weakness of the legs, with unsteadiness of gait, pronounced incoördination and difficulty of walking in the dark or with the eyes shut; this incoördination may involve the arms. Moderate rigidity of the legs develops late. There may be a dull, aching pain in the sacral region. Eye-symptoms are rare. The sphincters may become involved, and mental symptoms, like those of general paresis, may develop late. The disease runs a chronic course.

The diagnosis rests upon the presence of symptoms of paraplegia and ataxia, with absence of sensory and ocular symptoms.

Primary Combined Sclerosis.—Putnam and Dana describe under this name certain cases in which there is chronic sclerosis not only of the posterior and lateral columns (chiefly pyramidal tract), but of the cerebellar tract as well, accompanied with acute diffuse or systemic changes in the adjoining areas, slight degeneration in the gray matter, and involvement of the nerve trunks. The disease appears somewhat frequently in anæmic and neurotic women in the sixth decade of life. Sensory disturbances, as paræsthesia, are followed by progressive loss of strength in the extremities and spastic symptoms with exaggerated knee-jerk, culminating in paraplegia. The arms are often affected; marked mental enfeeblement may be noted late. The course of the disease is rather rapid.

Treatment of spastic paraplegia demands the removal, when possible, of the primary disease, as syphilis (mercury; potassium iodide) or caries. Friction maintained for a long time, with frequently repeated and intelligently practiced flexion and extension of the rigid muscles, is useful. Massage is always helpful. Much comfort may be afforded by the use of a well-fitted apparatus, which may aid the patient in getting about. At times orthopedic surgery can accomplish much toward giving relief,

especially when there are contractures. Electricity does harm rather than good. The remedies most likely to be of benefit are those given under treatment of locomotor ataxia.

LOCOMOTOR ATAXIA.

A disease, dependent chiefly upon degeneration of the posterior columns of the spinal cord, characterized by loss of coördination, loss of knee-jerk, pain, and involvement of the special senses, especially the eye. It is also described as *Tabes Dorsalis*, *Posterior Spinal Sclerosis*, *Gray Degeneration of the Posterior Columns*.

Ætiology.—Locomotor ataxia is a common disease, more frequent in cities than in the country, occurring in men about ten times as often as in women, and chiefly between the age of thirty to forty-five years. Its specific cause has been the occasion of much debate. It is fairly well demonstrated that in the great majority of cases it is closely connected with syphilis, statistics gathered from authentic sources showing that syphilis existed in from fifty to seventy-five, and more, per cent. of all the cases. Struempell states "that, as a rule, in most cases of tabes the previous syphilis has not had a great intensity. Only quite infrequently do we find tertiary symptoms as well as tabes; we have seen, for example, severe ulcers of the skin, gummous periostitis, etc. The time between the infection and the beginning of the first symptoms of tabes varies very much; it may be from two to twenty years." In women, also, it is affirmed by competent observers, syphilis is a common ætiological factor, even in women of unquestioned virtue. Other possible causes are still a matter of investigation. There is no reason to doubt that not infrequently locomotor ataxia occurs in men after severe exposure to cold and wet, as is the case with lumbermen; but this class of persons also furnishes many syphilitics, and the statistics do not show whether or not, in the collected cases, the question of syphilitic disease was excluded. Great fatigue, sexual excesses and, rarely, trauma are thought by many to be connected with tabes; others enter a firm denial. It is generally admitted that alcoholism is no factor.

Morbid Anatomy.—The following changes take place: Thick-

ening of the meninges over the posterior and lateral columns; they are abnormally adherent; arterio-sclerosis of blood-vessels. Degeneration of the peripheral nerves; often neuritis, sometimes with muscular atrophy. Gray, atrophied appearance of the posterior roots of the cord and of their ganglia; degeneration of the cells of the ganglia. Sclerosis of the posterior columns, most extensive in the lumbar and dorsal regions; increase of connective tissue throughout the cord in advanced cases, often with degeneration involving the ascending antero-lateral, the direct cerebellar and the pyramidal tract. In the brain: sclerosis in the restiform bodies, inferior peduncles of the cerebellum, and of certain cranial nerves (third, optic, auditory); cortical changes, sometimes diffuse meningo-encephalitis. The nature and development of the lesion is not understood. It is known that the sclerosis usually begins in the posterior root zones, the degenerative process extending upward along the root-zones and along the columns of Goll, but the seat of the primary lesion is still in the dark. Marie holds that degeneration of the spinal ganglion cells is responsible for the degeneration of the posterior root fibres and of their continuation in the cord, and his argument in support of this theory is, at least, plausible.

Symptoms.—The initial or *pre-ataxic* stage is characterized by the appearance of fulgurating or lightning pains, usually in the legs, with the development of striking eye-symptoms and loss of knee-jerk. The eye-symptoms consist of the Argyll-Robertson pupil and, often, blindness from atrophy of the optic nerve; not infrequently one of the first complaints made by the patient refers to the existence of double-vision, sometimes with paralysis of the external muscles of the eye, chiefly the rectus. This stage may last indefinitely, from two to twenty years, and recovery may take place. The second (*ataxic*) stage is marked by a striking exaggeration of motor disturbances, of which the so-called ataxic gait is the most prominent, interesting sensory phenomena, the so-called tabetic crises, trophic changes of a grave nature, and mental deterioration. The final stage, the stage of *paralysis*, finds the patient bed-ridden, death eventually occurring from some intercurrent disease, as pneumonia, tuberculosis, or pyelo-nephritis.

Special Symptoms.—*Sensory Disturbances.*—The fulgurating,

lightning pains occur in at least nine-tenths of all the cases and usually among the earliest symptoms; not infrequently they persist during the greater part of the course of the disease. As indicated by the name, they are sharp, intense, as though made by a red-hot iron, coming with the swiftness of lightning, lasting only a moment or two, but recurring at irregular intervals, which in exceptional cases are so brief as to render the pain almost continuous. They somewhat resemble the severe pains of gout. They are usually felt in the knee or ankle, but may follow the course of a nerve. There is neither tenderness to pressure nor increase of pain from motion; sometimes hard pressure relieves; there may be a sensation of heat or burning. The pain is particularly severe during periods of physical depression, as from overdoing. There may be tingling and pricking in the feet, frequently with numbness, and a sense of numbness and formication in the region of the ulna. Often mention is made of the "cincture feeling" or "girdle pain" about the head, neck, or limbs, according to the seat of the lesion. There are areas of anæsthesia or of hyperæsthesia. A common symptom is the sensation as though the patient were walking on wool, or felt, or velvet. Temperature sensation is usually diminished. Tactile sensation is often retarded, the prick of a pin not being felt for even ten, or more, seconds. Sometimes the patient cannot localize the pain; if a hurt is inflicted upon one foot he may feel it only in the other (*allocheiria*) or he may feel it in both feet or even in several places (*polyæsthesia*). The muscular sense is materially impaired, and may be so even in the early stage of the disease. Complete anæsthesia of the leg, still more rarely of the arms, has been observed in exceptional and far-advanced cases, with, possibly, disturbances of sensation in the skin of the face, probably the result of degeneration of the sensory ascending root of the trigeminus.

Motor Disturbances.—These develop rather gradually. Some of them arise in part from the disturbances of sensibility and are not truly ataxic. Thus the inability of the patient to stand firmly on his feet when his eyes are shut or to walk in the dark are much less due to incoördination than to the loss of muscular sense; but their presence is none the less significant. Nor can the patient stand steadily with his feet brought close together and his eyes closed, or on one leg (Romberg's symptom).

The characteristic incoördination is usually seen first in the legs; it is impossible for the patient, when lying down, to describe a circle in the air with one foot or to touch the knee of one leg with the heel of the other; the movement is carried far out of its intended course or beyond the point designated. The same incoördination, intensified by the impairment of muscular sense, is shown in the arm, when the patient, having closed his eyes, is told to touch the tips of the nose or of the ear with a certain finger. The ataxic gait is unmistakable. The patient walks with his body bent forward, his eyes on the ground, the legs spread, and propels himself forward by a violent, jerky effort, often raising the leg by a lifting of the pelvis, elevating the foot high, and then bringing it down to the ground with a stamp, as though it were a solid and lifeless mass, sometimes the heel first touching the ground, but oftener the entire sole of the foot striking at once. Not infrequently the body, in walking, sways like a pendulum. The support of a cane soon becomes necessary; after a little time two canes are needed; the ataxic condition finally becomes so pronounced that perfect helplessness results, the legs actually indulging in constant erratic and violent choreiform movements. Muscular power remains normal, as can be easily ascertained by directing the patient to firmly grasp the hand.

Disturbances of the Reflexes.—The knee-jerk is nearly always lost, often very early. In connection with other symptoms, as fulgurating pains and ocular symptoms, it materially aids in the diagnosis; by itself it is of no great value, since absence of knee-jerk may be found in persons of good health. The skin reflexes may be exaggerated at first, but later are lost.

Disturbances of the Special Sense Organs.—The most important changes are in the *visual* organ. Ptosis often occurs early, single or double, with or without external strabismus. Sometimes diplopia is the first symptom of which the patient complains. Paralysis of the external muscles of the eye, in most cases the rectus, may be transient early in the course of the disease, permanent when late. Pupillary changes are marked. The Argyll-Robertson pupil is seen in many cases. The symptom consists of failure of the pupil to contract to bright light, while the pupillary changes incidental to accommodation are perfectly normal, i. e., reflex immobility of the

pupils with retained mobility on accommodation. Usually there is great contraction of the pupils (*spinal myosis*). Optic atrophy with irregular contraction of the field of vision and disorder of the color sense—blindness to green and red first, to blue and yellow last—may be an early symptom. It is progressive and terminates in total blindness. In some instances blindness occurs early; it is stated upon the best authority that in cases of blindness coming on early the ataxia is aborted or, rather, that the ataxic phase of the disease proceeds no farther. Deafness may occur from lesion of the auditory nerve. Vertigo is not infrequent. Involvement of the olfactory nerve is rare.

Visceral symptoms constitute the so-called tabetic crises, which may be observed at any time, but not so often early in the course of the disease. These crises are characterized by paroxysms of severe pain in the organs to which they are referred. *Gastric* crises occur oftener than others. They consist of paroxysms of intense pain in the epigastric region, usually accompanied with violent vomiting and copious secretion of hyperacid gastric juice. Their appearance is sudden and their duration from a few hours to several days. The vomiting is at times sufficiently violent to produce bleeding (coffee-ground vomit). In some cases the pain is centered in the umbilical region and the symptoms are those of a violent choleraic seizure (*intestinal crises*). *Laryngeal* crises are associated with severe spasmodic nervous cough and distressing dyspnoea, which may become alarming. *Genito-urinary* crises present symptoms closely resembling stone in the bladder, with agonizing, darting pain in the urethra, or they assume the form of intense sexual excitement, with frequently repeated orgasms which rapidly become painful in the extreme. *Renal* crises resemble renal colic. *Muscular* crises consist of great lassitude, muscular weariness and soreness, followed by transient paralysis of the affected muscles. With the exception of the gastric and laryngeal forms, these crises are rare; muscular crises are very infrequent.

The sphincters may be involved. The flow of urine at first is slow and accompanied with an effort; later there may be retention, with danger of cystitis and pyelitis. Constipation is common, but toward the close of the disease paralysis of the sphincter may supervene. The sexual power at first is normal, rarely increased, sometimes weakened; in the late stage it is lost.

Trophic changes may occur early; thus the fulgurating pains are not infrequently accompanied with herpes, œdema and local sweating. Alterations in the nails may be seen; also falling out of the hair and nails. Ulcerations on the foot (on the heels, between the toes, beneath the big toe) are not unusual. They may be preceded by severe pain in the part, or there may be a small, dark spot under the skin which soon becomes detached or turns into a thick, horn-like mass, followed by sloughing and deep ulceration, usually surrounded by extensive infiltration of tissues. The *joint affections* (arthropathies of tabes) are of great clinical interest. They usually involve the knee, ankle, or hip, but may attack any joint of the body. There is extensive serous effusion, causing great swelling, especially about the knee joint; the swelling is hard, pale, resistant, and is followed by disintegration of structures and destruction of bone and cartilages, causing luxations and deformities. Spontaneous fractures are not uncommon. Muscular atrophy occurs in some cases late in the disease and is not to be mistaken for the effects of that general emaciation which is nearly always observed after the ataxic stage has well begun. Vulpian has pointed out the frequency of valvular disease of the heart (chiefly insufficiency of the aortic valve) in locomotor ataxia, which probably is of trophic origin. *Cerebral Symptoms*. Aside from the affections of cerebral nerves which have already been discussed, there is often a tendency to dementia paralytica, melancholia, imbecility, paranoia, and other forms of insanity. *Hemiplegia* is occasionally seen in connection with tabes; it is usually due to hæmorrhagic softening.

Course, Termination, Prognosis.—The course of locomotor ataxia is intensely chronic, the pre-ataxic stage alone sometimes occupying ten, fifteen or twenty years. The case may never progress beyond the first stage, especially when there is early loss of vision. In others there is a gradual, almost imperceptible, drifting into the ataxic condition, while in some instances the severe symptoms may appear suddenly and progress rapidly. Frequently the affection remains stationary for a long time, or there seems to be a positive improvement, when an unexpected acute exacerbation ruthlessly destroys the hopes of the patient. In rare instances the disease runs a comparatively rapid course, the paralytic stage being reached in a few

months. That there is slight danger to life from ataxia is proved from the frequency with which patients live for fifteen and twenty years after they have become bed-ridden. Recovery, however, is exceedingly rare, and probably not possible.

Diagnosis.—The early recognition of locomotor ataxia is important and usually not difficult in the presence of the characteristic pains, absence of knee-jerk in both limbs, and the typical ocular symptoms. When these symptoms are all present, the diagnosis of tabes is positive. Later, also, the symptoms usually are characteristic, and a diagnosis should be difficult only in exceptional cases and when the patient has not been long under observation. A differentiation between locomotor ataxia and *General Paresis* may tax the most skillful diagnostician in view of the fact that both diseases may co-exist in the same person. *Peripheral Neuritis*, by its gait, may suggest locomotor ataxia, but the gait of the former lacks wholly the truly ataxic element, being due not to incoördination, but to paralysis of the feet, which must be lifted high from the ground by a special and deliberate effort, so that the toes may clear the floor. The character of the pains also is different in neuritis; they are not fulgurating, and there is great soreness to pressure over the nerve-trunks. There should be no danger of confounding *hysterical affections* (astasia and abasia) with tabes; in the former the pains are not fulgurating; the muscular incoördination, as revealed by carefully made tests, is absent; the knee-jerk is rarely lost; the course of the disease is irregular; the history of the case and concomitant symptoms suggest hysteria. A ready recognition of the *tabetic crises*, when first seen, cannot be expected. Their nature, however, will be understood when the physician has become familiar with the history of the case. The suddenness of their onset and their intensity, compared with rapid recovery of functional integrity of the organs affected and the absence of any lesion in them, will aid in placing them. The so-called "cardiac" crisis superficially resembles true *angina pectoris*; but the pain occurs in rather more prolonged paroxysms, its seat is in or about the axilla on either side, does not shoot into the left arm or, when it does, is quite liable to dart from the left arm into the body and right arm. The history of the case will also help determine the diagnosis.

Treatment.—Painstaking attention to all details of the patient's daily life is absolutely required. He must be taught to avoid everything that needlessly exhausts his vitality, without, however, robbing him of the pleasure and profit which may be derived from such an occupation as he may be able to follow. Nothing can be more harmful than to make the patient feel that anything is to be gained by a wholly indolent or useless life. Leaving out of consideration the value of the individual life to society, it is yet a fact that there is no greater mistake than to impress an invalid with the belief that he is incapable of a reasonable amount of serious occupation; to do so is to make of him a misanthrope and a crank, and to actually hasten that complete physical breaking-down which it is sought to avoid. Keep the patient usefully and pleasantly employed, within the limits of safety, and secure his intelligent coöperation in all measures calculated to strengthen and improve him, and the semi-invalid may be considered in the best possible position for successful treatment. The things to be especially avoided are: physical and mental exhaustion, exposure to wet and cold, indulgence in alcoholic stimulants, the use of tobacco (except most moderate), and sexual excitement and intercourse. Observation has fully shown that sexual gratification materially hastens the development of ataxic symptoms; thus blindness has rapidly followed even a moderate degree of license in this direction. Osler wisely insists that marriage during the pre-ataxic stage must be absolutely forbidden. The diet should be nutritious but non-stimulating; a little wine may usually be taken at meals. Particular attention must be paid to the diet of persons who have had gastric crises.

When pain is excessive, rest in bed is indicated. Hot baths (Turkish baths) used at times of such suffering may afford relief; generally speaking, their long-continued use in ataxia is not desirable, while the tepid bath (not to exceed 86°), followed by brisk rubbing, may be used persistently and with advantage. During the crises, however, the hot bath and hot packs may render good service. Should these prove inefficient, antipyrin, antifebrin, acetanilid or phenacetin may be used, and in many cases they act nicely. As a last resort, and as such only, hypodermic injections of morphine, with atropine, are indicated. It is a proof of good sense on part of the medical attendant to

refuse morphia until its exhibition can no longer be safely delayed. The bladder requires constant watching. It is of the greatest importance to prevent the presence of residual urine in the viscus, and the regular use of the catheter becomes an imperative measure so soon as this occurs. Ammoniacal urine demands washing-out of the bladder at least every other day with some antiseptic solution.

Concerning the use of electricity, claims and counter-claims have been made for various methods of applying it. In spite of strong prejudice in favor of electricity as a therapeutic agent, especially in the treatment of diseases of the nervous system, I am from personal experience and observation convinced of its worthlessness in the treatment of ataxia, save as it leaves upon the mind of the patient the impression that "something is being done." The local use of the wire-brush, with strong current, often relieves excessive numbness. Counter-irritation is still advised by some authorities, but is in every sense worse than useless. Nerve-stretching, once warmly advocated, is no longer practiced. Treatment by suspension has proved disappointing and dangerous.

In spite of the close connection between locomotor ataxia and syphilis, anti-syphilitic treatment here is universally acknowledged a waste of effort save in the rare cases of ataxia following primary infection within two years.

ARGENTUM NITRICUM. Clinically this remedy is one of the most important. Although first extensively employed in homoeopathic practice, it has long been generally recommended. Its symptomatology embraces many pathognomonic symptoms of locomotor ataxia, as lightning pains, loss of deep reflexes, incoördination of muscles, including the motor muscles of the eye, optic-nerve atrophy, contraction and unequal dilatation of pupils, girdle sensations, ataxic (tottering, irresolute) gait, drawing and jerking in legs and arms, etc. There is vertigo when he attempts to walk with his eyes closed, so he must take hold of things. The legs feel numb; without feeling, as though of wood; there are trembling and convulsive movements. It is well adapted to nervous affections connected with sexual excesses, and has sexual weakness to impotence. It has cincture feeling around the chest. It causes characteristic violent cardialgia, suggesting its use in gastric crises.—ZIN-

CUM (*Z. PHOSPHORICUM*). Also used by all schools. It is of more value in the early stage than late. Weakness, trembling, unsteadiness and incoördination in the legs; formication in feet and legs; fulgurating pains extending to the knee; twitching of muscles; diplopia; strabismus; impotency; soreness and pain in the last dorsal vertebræ.—*PHOSPHORUS*. Like *ZINCUM*, it acts powerfully upon the nervous system and affects the nerve-elements. It is indicated when there is burning, tearing pain along the spine and in the extremities, with formication; there is general exhaustion, affecting also the legs, with paralytic tendency rather than incoördination. Atrophy of the optic nerve, with flashes of light. Anæsthesia. Intense sexual erethism. Exhaustion of the vital forces and nervous affections from sexual excesses.—*NUX VOMICA* has proved very useful, not merely as an intercurrent, as suggested by T. F. Allen, but in cases of great irritability of the muscular fibre, with much jerking and almost choreiform, violent movements. Numbness and easy "going to sleep" of the limbs is marked. In my experience it has yielded the best results when given highly attenuated. In two cases it acted promptly, my attention being drawn to the remedy by the concomitant symptoms; in neither case was the diagnosis doubtful. In one case, that of a business man, a striking improvement was produced in five months under the action of *NUX 200*, which has continued uninterrupted for nearly as many years.—*AGARICUS* is valuable in cases where during a long pre-ataxic stage there is much suffering from pain of an intense, sharp, shooting character, worse from exercise; cardiac crises.—*PLUMBUM MET.* and *THALLIUM* are helpful in controlling the violent neuralgic pains. (*THALLIUM*: lancinations following each other with the rapidity of electric shocks.)—*ARSENICUM ALBUM* is reported to have very materially helped cases of tabes with intense burning pain and characteristic cardialgia.—*ALUMINUM* was recommended by Von Bœnninghausen, who claimed to have cured with it four cases of ataxia. In his cases sensation as of cob-webs on the presface, frequent dizziness and characteristic constipation were ent. Soles of the feet feel swollen and too soft; numbness at the heels; cannot walk with his eyes shut or in the dark. Bruised pain in the back; pain as though a hot iron were thrust through the lower vertebræ.—*SECALE* has caused symptoms

which so strikingly resemble locomotor ataxia that this fact has been pointed out by writers of the dominant school; yet, its use by homœopaths is neither common, nor has it, to my knowledge, been followed by especially satisfactory results. It has "complete inability to walk, not for want of power, but on account of a peculiar unfitness to perform light movements with the limbs and hands; contraction of the lower limbs and hands; contraction of the lower limbs, on account of which the patient staggers." (Lilienthal.)

Consult also BELLADONNA (in early cases difficulty in walking on account of incoördination), RHUS (from exposure to wet), GELSEMIUM (recent cases; pains like electric shocks), PHY-SOSTIGMA. O'Connor claims good results from BERBERIS in the earlier stages of tabes and has had from ANGUSTURA relief of the fulgurant pains when all other remedies failed; he recommends SABADILLA when the pains are confined largely to the feet.

HEREDITARY (FRIEDREICH'S) ATAXIA.

Ætiology.—Friedreich's ataxia is a family disease, occurring often in various members of the same family, but is not directly transmitted from parent to child. It is in all probability the outgrowth of a strongly developed inherited neuropathic tendency, whose expression in this particular form arises from causes not yet understood. Whatever increases this neuropathic tendency or weakens the vital forces, thus lessening the powers of resistance, aids in the development of the disease; inherited syphilis, tuberculosis, a severe acute sickness or, in older persons, intemperate habits may therefore be counted ætiological factors. Consanguineous marriages are also prejudicial. The disease occurs early in life, from fifty to sixty per cent. of all cases beginning prior to the tenth year.

Morbid Anatomy.—There is extensive sclerosis of the posterior and lateral columns and of the cerebellar tract; the cerebrum appears not to be involved.

Symptoms.—Distinct prodromal symptoms are rarely noticed. There is usually first awkwardness in the movements of the legs and arms, exceptionally simultaneous embarrassment of speech. Incoördination soon becomes pronounced, develop-

ing a gait which may be truly ataxic, but much oftener is characterized by an irregular swaying motion, like the gait of a drunken person; the "stamping" of the ataxic gait is nearly quite absent. Romberg's symptom is occasionally observed. In the arms muscular incoördination leads to irregular choreiform movements which are fatal to nicety of movement or delicacy of execution; all the movements are overdone. Friedrich's "ataxia of quiet action," which, according to this authority, is characteristic here and is never seen in locomotor ataxia, consists of inability to hold the arm still in extension or in any other slightly forced position. It occurs late in the course of the affection and may even cause wavy or non-rhythmic movements of the arms and legs when at rest or of the fingers when the hand is quietly lying in the lap. Tremors and choreiform movements of the head, aggravated by excitement and sometimes involving the shoulders, also belong here. Disturbances of speech are common. Speech may be jerky and stuttering; oftener it is drawling or "scanning." In cases of bulbar involvement speech is rendered difficult and unintelligible by resulting lack of control over the lips and tongue, the involuntary escape of saliva from the mouth, and the fibrillary contractions of the muscles about the mouth. Sensory symptoms are trifling and consist of slight numbness, tingling and formication. Girdle-sensation is rarely felt. Reflexes may be almost normal; frequently the knee-jerk is lost; cutaneous reflexes are sometimes diminished. Of ocular symptoms nystagmus is the most characteristic. The oscillating movements of the eye may appear during near sight (Friedreich's ataxic nystagmus) or when the eye is supposed to be at rest (static nystagmus). There may be some impairment of vision, strabismus, diplopia or ptosis, but the Argyll-Robertson pupil is not seen. Exceptionally there is optic nerve atrophy. Trophic lesions are rare. Late in the course of the disease complete paralysis may supervene. Muscular contractions also are frequent at this time, giving rise to lateral curvature of the spine and to various deformities of which talipes equinus is the most important. There is frequently moderate dulling of the intellect, but rarely serious mental impairment.

Marie described a "cerebellar heredo-ataxia" which occurs later in life, at about the twentieth year, with "groggy" gait,

retention of knee-jerk, late spastic condition of the legs, and without scoliosis or club-foot. Cerebellar atrophy was found in two cases.

The course of the disease is intensely chronic, and the prognosis hopeless. Treatment is purely symptomatic and palliative, with special care to prevent deformities.

SYRINGOMYELIA.

This affection consists of the formation of a cavity near the centre of the cord, thought to be due to the destruction of proliferated masses of neuroglia, followed by secondary inflammation, disintegration and cavity-formation. The cavity involves the substance of the posterior column and extends longitudinally, often occupying the cervical and dorsal regions, sometimes other portions, of the cord. In rare cases two or three cavities may exist at the same time. The affection usually begins before the thirtieth year; it is more frequent in men than in women.

Symptoms.—When the cervical portion of the cord is the seat of the affection, as it often is, there is gradually increasing loss of muscular energy with atrophy of the muscles. Characteristic disturbances of sensibility show themselves. Although muscular sense and tactile sensation are normal, there is loss of the temperature sense and of the pain sense (analgesia), a condition of great importance since the patient is constantly liable to burn or otherwise injure himself.

Trophic disturbances are common. The lower extremities usually escape for a long time, but eventually a spastic condition supervenes, sometimes followed by paresis. Reflexes are increased. The special senses and sphincters are rarely involved. Arthropathies occur in about ten per cent. of the cases.

The distribution of the thermo-anæsthesia varies in different cases and from time to time in the same individual. It may involve the entire body, skin and mucous membrane. A typical case gives rise to special symptoms; thus, disturbances of deglutition and speech and bulbar paralysis may occur when the upper part of the cervical is involved. In rare cases syringomyelia was discovered after death when no characteristic disturbances whatever had occurred during life.

The *course* of the disease is tedious and the prognosis serious; but life may be indefinitely prolonged; the possibility of recovery has been stoutly maintained.

The diagnosis in typical cases is easy. The presence of normal muscular sense and of tactile sensation with temperature anæsthesia and analgesia are important. *Anæsthetic leprosy* has both anæsthesia and wasting, but the trophic changes are much more extensive (loss of fingers and toes) and the distinctive sensory disturbances are wanting.

Treatment consists of protection of the patient against burns and other forms of injury, careful watch upon possible cystic trouble, the use of electricity and massage to combat the wasting of muscles, and the exhibition of the symptomatically indicated remedy. French writers recommend counter-irritation by means of the actual cautery and suspension.

COMPRESSION MYELITIS.

Slow compression of the cord from different causes, followed by interruption of its functions.

Ætiology.—The most important cause is caries of the vertebræ, in a very large number of cases of tubercular origin. The subjects are usually young persons or those in middle life. Caries may be of syphilitic origin; rarely it results from extension of disease of the pharynx. Cancer of the vertebræ is a much less frequent cause and is usually seen in older persons; it may be primary or, oftener, secondary, due to extension of malignant disease of the breast, stomach, œsophagus or retro-peritoneal growths. Occasionally compression of the cord is due to aneurism (thoracic aorta or abdominal aorta in the neighborhood of the cœliac axis) or to the presence of parasites in the cord (echinococci or cysticeri).

Symptoms.—The symptoms which refer to the disease of the vertebræ may exist for a long time before the nerve-roots are involved or before actual compression of the cord occurs. Usually there is more or less deformity at the seat of the local disease, which may amount to an angular curvature, with sense of stiffness in the spine and pain, aggravated from touch and motion. When the vertebræ are eroded in the process of a malignant disease or aneurism, there may be no deformity, but

the pain is usually severe, sometimes almost unbearable. Compression is not so much direct from the bone, as it is the result of dural thickening and of the presence of inflammatory products. It is first exerted upon the nerve-roots as they pass out between the vertebræ, and may give rise to severe pain following the course of the nerve, of a dull, dragging, or neuralgic character. These pains extend into the arms and shoulders, lateral portions of the trunk or into the legs, according to the seat of the affection. In some cases no pain is felt. Formication, numbness, and sense of coldness are frequent.

Motor disturbances follow stiffness and weakness of the parts gradually progressing to paresis and complete loss of power, the seat of the affection determining the muscles involved. There is commonly blunting of sensibility to sensations, especially of pain, and then scattered areas of anæsthesia. Trophic disturbances do not occur in the paralyzed parts. In tedious cases the nutrition of the skin is materially affected; it becomes dry, scaly, and occasionally covered with eruptions; the nails become brittle; bed-sores form easily unless precautions are taken to avoid this complication. The nutrition of the muscles and their electrical reaction may be normal while their trophic centres are not involved, but atrophy of the muscles of the legs may occur when the point of compression is above the lumbar cord and the electrical reaction of the nerves is normal. Involvement of the lumbar region of the cord or of the fibres of the cauda equina necessarily results in atrophic paralysis of the legs, with reaction of degeneration. Involvement of the cervical portion of the cord may be followed by atrophic paralysis of the arms. The bladder and rectum are usually affected in severe cases.

If compression be slight, the symptoms are those of mild sensory irritation and trifling paresis. With increasing compression the symptoms become more serious; disturbances of sensibility are marked and the paresis increases to complete loss of power, accompanied with vesical and other disturbances which belong to this condition. In some instances the primary disease may exist for a long time before compression-symptoms appear, and the latter may even then be so mild as to cause little trouble; in others the spinal symptoms may assume a serious

aspect from the beginning and wholly overshadow the primary affection.

As has been intimated, the seat of the compression determines the nature of the spinal symptoms. Reference to the "Focal Lesions in the Spinal Cord" at the beginning of this section will be sufficient to elucidate these.

The *course* and prognosis depend upon the nature of the primary disease. Recovery is out of question in the presence of malignant disease. When the primary cause comes within the reach of successful treatment, it is possible that permanent relief and even complete cure of the pressure paralysis may be brought about, except in cases where there is constitutional tuberculosis, which in itself may terminate life, or where a profoundly cachectic state precludes permanent improvement, or where cystitis, bed-sores or other complications have arisen and bar the way to recovery.

The diagnosis is easy when the local disease can be recognized. To this end, in a case which at first seems obscure, diligent search must be made for evidence of local pain and tenderness on pressure and for such trifling deformities as might easily escape attention. It must be remembered that often in caries the local symptoms are surprisingly slight; when such is the case, the diagnosis rests upon the symptoms caused by pressure upon the nerve-roots, as shown in slight sensory irritation, motor paralysis, and in considerable abnormalities of sensibility. Persistent lumbago is frequently present in Pott's disease, especially from injury. Malignant disease may be suspected when the pain is intense (*paraplegia dolorosa*), when the history of the case shows the previous existence of cancerous growths (especially cancer of the breast, with operation), or when nodules in the breast or suspicious enlargement of lymphatics are present and when there is marked cachexia. The pain experienced from compression due to erosion by retroperitoneal growths is agonizing.

Treatment.—The treatment is largely surgical and includes "extension" which, properly practiced, has given excellent results in Pott's disease. Constitutional treatment, as of tuberculosis, is important when indications for it exist. The value of remedies like ARSENIC, AURUM, SILICA, SULPHUR, and others, suggested by the presence of caries, is apparent. Massage and electricity exert a favorable effect upon the paralyzed muscles.

LESIONS OF THE CAUDA EQUINA AND CONUS MEDULLARIS.

These result from injury (fracture), caries or tumor at or below the level of the second lumbar vertebra. In a number of cases injury to the cauda equina was followed by paralysis of the bladder and rectum alone, with, sometimes, anæsthesia in the neighborhood of the coccyx or perinæum, limited to a small area. When branches of the lumbar or sacral nerve-roots are involved, as is usually the case, an irregularly distributed motor and sensory paralysis in the legs results. Compression of lumbar nerve-roots, from the second to the fifth, causes paralysis of the muscles of the legs excepting the flexors of the ankles, the peronæi, long flexors of the toes and the intrinsic muscles of the feet, with loss of sensation of the inner surface of thighs, legs and feet and of the outer part of the thighs. In a case of involvement of the sacral roots alone, reported by Osler, seen sixteen years after the injury, "there was slight weakness with wasting of the left leg; there was complete loss of the function in the ano-vesical and genital centres, and anæsthesia in a strip at the back part of the thigh (in the distribution of the small sciatic), and of the perinæum, scrotum, and penis. The urethra was also sensitive."

TUMORS OF THE SPINAL CORD AND ITS MEMBRANES.

Tumors occur oftener in the meninges than in the cord. Fibromatous, sarcomatous, tuberculous and syphilitic growths are observed on the dura; tuberculous, syphilitic and gliomatous growths in the cord.

The symptoms are those of compression of the cord and nerve roots, differing in character and intensity with the size and position of the tumor, the rapidity of its growth, and the degree of inflammatory action caused by it. When in the dura, the resulting compression is slow and progressive. When within the cord, it may cause syringomyelia, sometimes myelitis. There may be ascending and descending degeneration. Loss of motion and sensation are prominent. A small tumor

may at first only affect one-half of the cord, in which case there is motor and sensory monoplegia. The reflexes are first increased, then lost. If the tumor be in the dorsal region, the reflexes in the legs are retained. Trophic disturbances only occur from secondary lesions of the cord. The so-called "root-symptoms" consist of pain, paralysis and atrophy of muscles, muscular contractures, and change of electro-muscular contractility. The pain is sharp, lancinating, clawing, usually intense, and arises from the irritation of the nerve roots by inflammatory action. It may be constant or occur in paroxysms, follows the nerve trunk throughout its course, and is associated with keen, girdle-sensations. Finally there is complete anæsthesia without lessening of the pain (*anæsthesia dolorosa*). Cancerous tumors usually give rise to intense suffering.

The diagnosis is uncertain. Spinal tumor is suggested by the intensity of the pain; the simultaneous occurrence of motor and sensory paralysis; the absence of trophic changes save as there is secondary lesion of the cord; the unilateral character of the paralysis when the tumor is small; the abrupt limitation of the paralysis; and occasional marked improvement or change for the worse, possibly due to change in fullness of the vessels or to hæmorrhages in the substance of the tumor (Struempell). *Transverse myelitis* from spinal caries presents many similar symptoms. The pain here, however, is not nearly so severe, except as there may be inflammation about the nerve-roots; in the absence of such inflammation the pain is dull, gnawing, boring, especially when in the back; there is also tenderness upon pressure over the diseased vertebræ.

The prognosis is unfavorable.

The treatment is symptomatic and unsatisfactory, except that in some cases of syphilitic origin specific treatment may prove successful. Surgical methods, though full of risk here, may be justified as a last resort.

PROGRESSIVE SPINAL MUSCULAR ATROPHY.

A chronic disease due to slowly degenerative changes of trophic or motor centres in the cord (or medulla), characterized by slowly progressing atrophy, with loss of power of corresponding muscles or groups of muscles. That form in which

the seat of the affection is in the medulla will be considered separately (see Bulbar Paralysis). The forms here considered are *Progressive Muscular Atrophy* and *Amyotrophic Lateral Sclerosis*, also known as *Wasting Palsy*, *Cruveilhier's Palsy*, *Aran-Duchenne type of Progressive Muscular Atrophy*, *Poliomyelitis Anterior Chronica*.

Ætiology.—Nothing positive is known of the causes of this affection. In some cases (amyotrophic form) it seems a feature of senile degeneration. It is rare before the thirtieth year of life (progressive muscular atrophy in those younger is usually due to disease of the muscles), and more frequently attacks men than women. Heredity is a factor in some cases.

Morbid Anatomy.—The essential feature is slow degeneration of the motor paths, involving particularly the nerve cells of the anterior horns and the anterior root-fibres. The following changes occur: *Muscles.* Narrowing of the fibres, fatty and vitreous degeneration, longitudinal splitting-up of the fibres, with eventual destruction of fibres. *Peripheral nerves.* Degeneration and destruction of the nerve-filaments, first and chiefly affecting the anterior roots. *Cord.* Atrophy and, in places, disappearance of the large ganglion cells in the anterior cornua, with increase of the neuroglial tissue. Often sclerosis in the antero-lateral tracts, leaving the direct cerebellar and antero-lateral ascending tracts normal (Charcot's amyotrophic lateral sclerosis). Degenerative changes of medullary gray matter, sometimes with wasting of motor nuclei. Degeneration in the pyramidal tracts through the pons and capsule and wasting of large ganglion cells in the motor cortex.

Symptoms.—The onset of the disease may be very slow, almost imperceptible. The patient may suffer from pains of a character that suggests rheumatism, followed in due time by some loss of muscular energy, with only flaccidity or, later, slight wasting of the weak muscles. In some cases sluggish fibrillary contractions in different parts of the belly of a muscle occur at this stage and are indicative of danger to the structural integrity of the affected fibres; exceptionally, in rapidly progressing cases, these fibrillary contractions are very active and a source of great torment.

The hands are nearly always first affected. According to some observers, the interossei are first implicated; others main-

tain that the first change is atrophy of the muscles of the ball of the thumb. In all cases the muscles of the ball of the thumb, interossei and lumbricales are affected early, and the atrophy of these muscles, with contraction of the flexors and extensors, produces the striking deformity known as claw-like hand (*main de griffe*; Duchenne) which is so commonly seen in muscular atrophy. Other portions of the body become involved and may be attacked before the hands or arms. In the forearms the flexors are usually involved before the extensors; in the shoulder-girdle the deltoid suffers first; or the pectoralis major, the serratus magnus or possibly the lumbar muscles are involved early. Of the trunk-muscles the trapezius is usually the last to be affected. When the disease begins in the legs, the glutei, vasti, and tibialis anticus are involved first. In nearly all cases there is a rough symmetry of wasting, though the corresponding muscles on both sides of the body may not be affected evenly. The muscles of the face escape until late. Eventually, from general atrophy of the muscles, the patient becomes to all intents and purposes a living skeleton. Deformities are frequent from loss of power in certain muscles and contractures in their antagonists; mere loss of power may give rise to serious inconvenience, as the inability to hold up the hand, and to subluxation by elongation of ligaments (as in the shoulder-joint). There may be coldness and numbness of the affected limbs, with normal sensation; the muscles respond less and less energetically to electrical stimulation, and finally cease to respond, first, to the faradic, then to the galvanic, current; the reaction of degeneration is said to be present in advanced cases, but its existence is called into question by some observers. After muscular excitability has been lost, the nerve-trunks may still respond to the electrical stimulation. H. C. Wood states that in cases where the fibrillary contractions of the muscular fibre are very severe, an abnormal readiness to respond to the faradic current may be seen. The reflexes in the affected muscles are eventually diminished or lost.

The *amyotrophic lateral sclerosis* of Charcot has wasting of muscles with loss of power, characterized by spastic contractions and heightened reflexes (even to jaw-clonus) not observed in the other forms. The extremities may be affected first or the disease may involve arms and legs simultaneously.

Trophic symptoms may predominate in the arms and spastic symptoms in the legs. The "spastic gait" is usually marked. Wasting of muscles is not as great as in the atonic form above described. Sexual power may be lost early. In this form extension of the disease upward, with symptoms of glosso-labial paralysis, is frequent, often followed by tremors, failure of memory, and dementia.

Diagnosis.—There is usually no difficulty in recognizing this affection, although the progressive muscular atrophy of myopathic origin presents many similar symptoms. However, the lateral affection is peculiar to young people, begins very rarely in the hands, but in the muscles of the shoulder-girdle or in the peroneal group, is a disease of early childhood and a family affection.

The *course* is chronic and shortened by extension upward.

The prognosis is hopeless.

Treatment consists of vain attempts to arrest the progress of the degenerative process by the exhibition of ARSENIC, STRYCHNIA, or PLUMBUM, or the employment of massage.

BULBAR PARALYSIS (GLOSSO-LABIO-LARYNGEAL PARALYSIS).

An affection involving the motor nuclei of the medulla oblongata. It may occur as a primary affection, but usually is incidental to degeneration of the nuclei of the motor path. It may be acute or chronic.

Acute (Apoplectiform) Bulbar Paralysis is rare; it results from hæmorrhage into the pons or medulla; also from embolic softening; more rarely from inflammatory softening, as after certain fevers. The affection is sudden in its onset, and is recognized by the rapid loss of speech and swallowing; paralysis of the laryngeal muscles is frequent. The affection nearly always proves rapidly fatal, but exceptionally recovery may occur. There may be monoplegia or alternate hemiplegia with paralysis on one side of the face and on the other side of the body.

Chronic Bulbar Paralysis.—The symptoms develop very gradually. There is difficulty in articulating, at first in pronounc-

ing dentals and linguals (alalia or anarthria). The tongue soon becomes visibly atrophied, flabby, thin, flat; it looks furrowed and depressed; there may be fibrillary twitchings of muscular fibres in the tongue. Loss of power follows atrophy and is in proportion to the fibres wasted. Eventually the tongue lies limp and flat on the floor of the mouth, interfering with speech, chewing and swallowing. In the meantime the muscles of the lips are invaded. There is first a sensation of stiffness and awkwardness in the lips; after a time it is found difficult, and then impossible, to purse the lips and to pronounce the letters O, P, F, B, and others, or to whistle. Later the lips become thin and sharp; fibrillary twitchings may also be felt in them. The muscles of expression, supplied by the lower division of the facial nerve, are now affected; hence the characteristic face of bulbar-paralysis, the half-open and wide mouth, with drooling, the flabby, drooping lower lip, deep naso-labial folds, and the stupid lachrymose expression of the countenance. The involvement of the pharyngeal and laryngeal muscles still further increases these troubles and the danger of the patient. Paresis of the soft palate adds to the difficulty of swallowing, and there is frequent regurgitation of liquids through the nose. The voice becomes nasal. Involvement of the laryngeal muscles prevents the natural modulations of the voice. Imperfect working of the arytenoid cartilages allows food to enter the larynx, exciting bronchitis or pneumonia. Paralysis of the vocal cords gives rise to aphonia. Severe dyspnœa may be caused by inability to cough and to get relief from the accumulation of mucus in the throat.

Emaciation is unavoidable. The reflexes are diminished or lost, so that gagging can no longer be excited by tickling the fauces. Sometimes there is exaggeration of reflexes (jaw-clonus). Exceptionally the muscles in the region supplied by the motor branch of the trigeminus may be involved, and there may be ptosis or strabismus from involvement of the ocular muscles. Sensation remains intact throughout.

Occasionally there is complaint of heat and "boiling" in the head. The salivary secretion seems to be actually increased. The pulse toward the close frequently becomes rapid. The mind remains clear, but there may be great emotional activity. Death results from inanition, pulmonary complications (bron-

chitis, aspiration pneumonia, pulmonary gangrene) and from failure of the respiratory centres; sometimes there is fatal choking while attempting to eat. The duration of the disease usually covers from two to five years, with occasional periods of improvement.

Treatment promises little, if any, permanent help. PLUMBUM, ARSENICUM, ARGENTUM NITRICUM, PHOSPHORUS and possibly STRYCHNIA should be of some service. Electricity may aid in maintaining for a considerable length of time the integrity of special muscles. The stomach tube must be used for purposes of feeding the patient as soon as deglutition is seriously interfered with, but it must be introduced and manipulated with great care to avoid injuring the parts. In many cases rectal alimentation is preferable.

DISEASES OF THE NERVES.

NEURITIS.

Inflammation of the nerve-fibres may be localized or multiple; of the latter, several types are recognized.

LOCALIZED NEURITIS.

Ætiology.—A very common form is the result of cold (rheumatic neuritis), usually exposure to a draught of air; it is seen often in the facial, sometimes in the sciatic, nerve. Frequent causes are: Injury, as from fracture, wounds or bruising of the nerve, as in the neuritis which occasionally follows child-birth from injury to the pelvic nerves by pressure from the foetal head or forceps. Extension of inflammation from neighboring parts, chiefly disease of the bones, as in spinal caries or otitis media, syphilitic disease, malignant tumors. Localized neuritis may also occur in connection with diseases of the joints (especially of hip, shoulder, knee) or, rarely, from the action of certain poisons.

Morbid Anatomy.—The nerve trunk is swollen and thickened. The nerve-sheath is reddened and infiltrated. The infiltration of round cells into the sheaths and interstitial tissues may be

sufficient to appear as purulent neuritis; this is common in cases due to inflammation from diseased bone. In mild cases the nerve fibres may present no visible changes, but in severe cases there is disintegration of the sheaths and axis cylinders, and finally destruction of the fibres, in part due to pressure exerted upon them by the surrounding exudation and structures. Regeneration of peripheral nerves is often accomplished.

Symptoms.—There is pain in the inflamed nerve-trunks and in the region of their distribution, not infrequently extending beyond. The pain is burning, shooting, stabbing, persistent, with periods of intense exacerbation; it is always exaggerated by pressure over the affected nerve and by active or passive movement. It is associated with numbness and tingling. There may be pronounced hyperæsthesia, followed by loss of sensibility. Disturbances of motion consist of twitching, spasmodic contractions, impairment of motion, and even complete loss of power. In mild cases electrical reactions are not materially affected; in severe cases there may be reaction of degeneration. Trophic changes may be marked. The temperature of the affected part is frequently elevated, the skin may be reddened, and there may be local sweating. Often the skin is "glossy," the surface appearing perfectly smooth, shiny and "silky," without the natural lines and creases. Eczematous and herpetic eruptions are common; herpes zoster and arthritis occur in exceptional cases. The inflammatory action may, rarely, ascend the nerve-trunk and, according to Gowers, even reach the spinal cord and set up a subacute or chronic myelitis.

The duration of an attack is a week, or more; the neuritis may, however, become chronic, and then leads to atrophy of the muscles and to trophic changes involving the skin, fingernails and joints.

MULTIPLE NEURITIS (Peripheral Neuritis.—Polyneuritis).

Multiple neuritis presents an exceedingly complex picture, leaving the conviction that its essential symptoms must arise from systemic poisoning of some kind, modified in individual types by some peculiarity in the action of the responsible toxic agent and by the environments and idiosyncrasy of the patient. *Ætiologically*, Osler recognizes the following types:

The *Idiopathic* form, the result of exposure or exertion. The

toxic form, caused by (a) diffusible stimulants (alcohol, carbon monoxide, carbon bisulphide, etc.); (b) metallic poisons* (lead, arsenic, mercury, phosphorus); (c) animal poisons (diphtheria, typhus and other fevers, syphilis, tubercle, malaria, leprosy); (d) vegetable poisons (ergot, morphine, etc.); (e) endogenous poisons (rheumatism, gout, arthritis, diabetes, the puerperal state, chorea (?).) The *dyscrasic* form (cancer, anæmia, marasmus). *Endemic* neuritis or beri-beri.—Parenchymatous neuritis may be a late complication, and at times a precursor, of central disease, especially of locomotor ataxia.

Morbid Anatomy.—The lesions are those of localized neuritis, with the degenerative changes more marked at and near the periphery. When interstitial changes exist with the parenchymatous degeneration, they are more pronounced in the larger nerve-trunks.

Symptoms.—The beginning of a severe acute multiple neuritis is not unlike that of an acute infectious fever, consisting of a chill, prostration and fever, with a temperature ranging from 102° to 104°, often accompanied with malaise, headache, and possibly slight delirium. Pains are present, nearly always, from the very onset. They are pulling, tearing, burning, “fulgurating” pains, following the course of the nerves, usually with tingling, numbness, paræsthesia and hyperæsthesia. Loss of power develops simultaneously, usually first in the extremities, especially in the hands, arms, and upper leg; in exceedingly severe cases all the extremities may be involved at once. Frequently the legs are ataxic rather than paralyzed. Hyperæsthesia now changes into a loss of sensibility, with excessive sense of pain and soreness in the skin and deeper tissues; if the nerves of the trunk are involved, there is marked girdle sensation. The tendency of the paralysis is toward the trunk; in very severe cases there may be involvement of the nerves of special sense, causing loss of sight, hearing and smell, and of the oculo-motor nerves, giving rise to double vision and irregular pupils, followed by symptoms of bulbar disturbance and death from paralysis of the muscles of respiration. All the reflexes are usually diminished and may cease entirely. Electric excitability of affected muscles and nerves is generally lost, and there is the reaction of degeneration. Muscular atrophy occurs early and is pronounced. The pulse usually is rapid. The func-

tions of the bladder and rectum, with rare exceptions, remain normal. Trophic disturbances are frequent and consist chiefly of pigmentation and thickening of the skin, eczematous eruptions, œdema and bed-sores; the hair and nails are also involved.

In cases which assume a chronic form the symptoms of invasion are much more moderate, and there develops an extensive atrophic paralysis, chiefly in the lower extremities, but often in the arms as well, with loss of reflexes and only slight sensory disturbances; the sphincters are rarely involved. Muscular incoördination may precede loss of power. In some of these cases there are marked psychological disturbances, with enfeeblement of memory and intellect. Here, also, the disease may gradually progress to a fatal termination, or a complete or partial recovery may eventually take place. The nerves least liable to be attacked are the hypoglossal, the spinal accessory, the glosso-pharyngeal and the nerves of special sense. Variations from the course outlined are, however, very great, as will be seen from a description of the following types:

Alcoholic Neuritis.—This occurs oftener in women than in men and is generally slow of development; the premonitory symptoms often escape attention. Sensory symptoms appear first, consisting of numbness and tingling, pain resembling neuralgia, and frequently quite severe cramping. There is usually hyperæsthesia of the skin; more rarely areas of anæsthesia. The hands and feet are cold, discolored in blotches, somewhat swollen, and in women “glossy skin” is often seen on the hands and feet. Paralysis usually begins in the lower extremities, but frequently appears simultaneously in the hands and feet, preferably in the extensors, causing wrist-drop and foot-drop. The muscles are soft and waste rapidly; there is loss of the superficial and deep reflexes, and reaction of degeneration. The muscles of the face and the sphincters generally escape, but the involvement of the extremities may be complete. A marked feature of this type is the presence of cerebral disturbance, consisting of delirium, hallucinations, mania, melancholia and even dementia. The cerebral symptoms are undoubtedly the result of alcoholism, and not of neuritis, but their diagnostic importance renders them of value. The course of the disease is comparatively slow, although death may occur in a few days from

paralysis of the muscles of respiration. In tedious cases, contractures and deformities, especially of the lower limbs, are not infrequent. (See also "Alcoholism.")

Post-Febrile Neuritis.—These types occur during convalescence from, or in the course of, fevers and constitutional diseases. The neuritis following the *exanthemata*, especially small-pox, usually affects the legs, sometimes both, again only one. Great muscular wasting may be present. There is comparatively slight pain. Diphtheritic neuritis involves the heart, palate and eyes or, when general, the nerves of the extremities. It is of particular interest to the general practitioner because of the frequency with which it occurs and the gravity of it as a complication. In *diabetic neuritis* there are marked trophic changes, and pain may be excessive. A neuritis occurs in connection with *leprosy*, characterized by extensive trophic changes and anæsthesia. The form which is a feature of *senility* usually attacks the lower limbs, especially the calves; the sensory disturbances are more prominent than the motor. The neuritis from arsenical or lead-poisoning is discussed more fully under "Intoxications."

Endemic Neuritis or Beri-Beri.—Beri-beri is found chiefly in the tropics (Japan, in the West and East Indies, some parts of Africa, Cuba, etc.). A disease closely resembling it has been observed among New England fishermen following their occupation on the coast of Newfoundland.

Ætiology.—The various causes assigned are: ankylostomiasis, a diet composed largely of fish (decomposed fish), and an exclusive vegetable diet, chiefly rice. So far as the latter is concerned, it is a notable fact that in the Japanese navy, in which beri-beri has long extensively prevailed, a remarkable improvement soon followed the adoption of a more varied and hearty diet and the substitution of wheat for rice. The prominence of general constitutional symptoms which cannot be considered due to the affection of the nerves has led observers to search for a constitutional cause not yet recognized; of late, a specific micrococcus has been found, which is at present the subject of special study. Beri-beri attacks chiefly young men in overcrowded quarters and prevails during the hot season.

Symptoms.—Light cases are characterized by numbness, more or less pain, slight œdematous swelling, malaise, weak-

ness, anæmia with cardiac irritability and innutrition. In severer cases there is great loss of power in the arms and legs, which may involve the trunk and face, with rapid wasting of the muscles and reaction of degeneration. In some instances the œdema is marked, and effusion into the serous sacs (general anasarca) gives to them a distinct type (the "wet" type); in others, serious constitutional symptoms (vomiting, diarrhœa, enfeebled circulation, urinary suppression) overshadow the symptoms of neuritis, and death from heart-failure may occur in a few days ("pernicious" type).

Prognosis.—As stated in the beginning, regeneration of nerve tissues may be successfully accomplished even in serious cases; hence the prognosis of multiple neuritis is really more favorable than would at first glance appear. If the muscles of respiration escape, and their involvement is a feature principally of cases which from the start progress very rapidly, then recovery is the rule; but often this recovery is incomplete. In alcoholic neuritis death may occur as the result of complications due to alcoholism.

Diagnosis.—The diagnosis of multiple neuritis is not difficult. In many respects it resembles *Landry's paralysis* or *acute poliomyelitis*, but may be distinguished by the more deliberate development of the paralysis, the comparative symmetry of its distribution at the onset, and the tenderness over the nerve trunk. From *locomotor ataxia* it differs in the absence of Romberg's symptom, in the absence of incoördination, either entirely or nearly so, and in its gait, the gait of neuritis consisting of a deliberate lifting of the leg high to avoid catching the toe on the ground (steppage gait of Charcot), while that of ataxia is jerky and stamping. (See "Ataxia"). Tenderness over the nerve trunk is of great diagnostic value.

Treatment.—Perfect rest in bed is essential; if the case is severe, a water-bed is both a necessity and a luxury; the diet must be plain, nourishing, non-stimulating. To relieve pain, hot applications should be perseveringly tried in the form of cloths wrung out of hot water and frequently changed, hot water-bags or "Japanese stoves" or boxes; the latter are light and convenient, and can be purchased in all larger towns. In view of possible anæsthesia, care must be taken not to scald or burn the patient. If hot applications are not well borne or fail

to give relief, ice may be tried. The thermo-cautery, lightly applied along the nerve trunks, often acts well; chloroform liniment sometimes is soothing. If all these fail, recourse may, in case of great suffering, be had to acetanilid, anti-febrin or antipyrine, taking due precaution not to give large doses until the patient's ability to bear these substances has been ascertained by actual experiment with small doses. Morphia, hypodermically, should only be employed as a last resort. Sometimes the patient complains of coldness in the affected extremities; in that case they may be wrapped in cotton-wool. In alcoholic neuritis generous feeding is important; the rules given under "Alcoholism" should be followed out. After the acute stage has passed, massage, properly given, is exceedingly useful. The galvanic current may also be employed at this time, but never early in the case; the positive pole should be placed over the seat of pain, the negative pole over the spinal origin of the affected nerve or at the periphery. The sittings should be daily, and not more than five to ten minutes. Shocks and interruptions must be carefully avoided. Muscular atrophy calls for massage and the interrupted galvanic current.

ACONITE is beyond doubt of great value, not only in recent cases, or in cases arising from exposure to cold or with characteristic fever, or in localized neuritis, but often after the case has continued for some time, provided there is tense, drawing pain, with unbearable numbness and formication and a feeling as though the affected parts were "asleep;" there is also redness and heat of the affected parts.—BELLADONNA has excruciating pain, drawing, pressing, cramping, tearing, throbbing, from the periphery to the centre, often with bright redness of the surface, and with a perfect horror of having the parts touched, on account of their exquisite sensitiveness.—ARSENICUM. Of inestimable value in the neuritis of persons who are exhausted from anæmia or a tedious fever, or when neuritis occurs as a feature of alcoholism, or as the result of marasmus or cachexia (malignant disease). The indications are clear-cut and unmistakable. Motor paralysis is pronounced. The pain is burning and intense, with great anxious restlessness and prostration. Relief from external heat.—RHUS TOXICODENDRON. Of service when neuritis occurs as the result of exposure from getting wet; it is frequently indicated in sea-faring men who

have passed through a prolonged storm, drinking heavily and standing in water a good part of the time. The paralytic symptoms are prominent; of the sensory symptoms, numbness of the affected parts, with rheumatic stiffness and lameness, and tearing, drawing pains, are the most conspicuous.—PHOSPHORUS. Burning, stinging pains; sensation of numbness in the parts; feeling of constriction in the extremities; girdle-sensation. Spinal caries. Great exhaustion. According to O'Conner, in ascending sensory and motor paralysis, beginning at the ends of the fingers and toes.—PLUMBUM. Fulgurating, lightning-like pains. Great atrophy of the paralyzed parts.—ARNICA. Neuritis from a bruise or a wound. Sore, bruised pain.—HYPERICUM. Neuritis from a lacerated wound or from penetrating wounds made by some pointed instrument. Excessive pain, fullness and soreness of the affected parts; worse from damp weather. "Implication of posterior nerve-roots" (O'Conner).

Consult also: NUX VOMICA (alcoholic form; loss of power in the legs; numbness, formication); GELSEMIUM (paralysis of lower extremities; legs feel like lead); CAUSTICUM (paralysis); ARGENTUM NITRICUM (ataxic symptoms); CIMICIFUGA (O'Conner's best remedy in alcoholic neuritis); MERCURY (dropsical swelling; syphilitic cases); PULSATILLA, and others.

O'Conner reports a cure of post-diphtheritic polyneuritis cured by DIPHTHERIA-TOXINE (200th). He recommends BERBERIS when the neuritis is in the distribution of the nerves from the lumbar and sacral plexus, with characteristic bladder-symptoms; ÆSCULUS HIPPOCASTANUM when in the lesser sciatic and with characteristic rectal symptoms; PARAIRA BRAVA when in the anterior crural, with characteristic bladder symptoms; ANANTHERUM when in the upper dorsal roots.

NEUROMA.

Neuromata or new growths in the peripheral nerves may occur at any age and in any locality. Two kinds are recognized: the *true* and the *false*. The former contain nerve-cells or nerve-fibres; the latter are connective-tissue formations (fibroma, myxoma, sarcoma, lipoma).

The most common is the *amputation neuroma*, a little oval tumor of the size of a pea, or larger, found in the cut end of a nerve in a stump after amputation. It is exceedingly painful

and may recur after extirpation. Its presence frequently causes violent muscular twitchings. The so-called *tubercula dolorosa* consist of little nodules found on the nerves of the skin, about the joints, face, scrotum, back, neck, and elsewhere, constituting true or false neuromata which are usually movable and exceedingly sensitive to pressure. They cause much annoyance because they are easily knocked. At irregular times they appear only slightly or not at all painful, and then they diminish somewhat in size; occasionally they disappear spontaneously. Neuromata occur also on the nerves of the cauda equina and on peripheral nerve-trunks where they can be easily detected. *Plexiform neuromata* is a congenital affection, the nerve-tumors appearing in large numbers, by hundreds, in various parts of the body.

The symptoms consist of pain, often of a neuralgic character; occasionally, as in the cauda equina, they may by pressure cause anæsthesia and motor paralysis, oftener tremors or tonic spasms. In many cases they are painless.

The treatment consists of excision. If the latter be not practicable, electricity may be tried.

DISEASES OF THE CRANIAL NERVES.

DISEASES OF THE OLFACTORY NERVE.

The olfactory centre may be affected by destructive or irritative lesions. The former results in loss of smell (anosmia); the latter, in hallucinations of smell.

Anosmia.—Central anosmia may occur in such cerebral diseases as give rise to hemiplegia and aphasia, the loss of smell showing itself in the nostril on the same side as the lesion. It may also result from tumors of the anterior fossa of the skull, exostoses, or meningitis at the base of the frontal lobe. Total loss of smell may be due to atrophy of the nerve in old people (senile anosmia) and is occasionally seen in hysteria.

Partial anosmia is usually due to peripheral causes, as: nasal catarrh; great dryness of the nasal cavity; the result of certain occupations in the pursuit of which workmen cease to notice odors which at first were very offensive (scavengers, workmen in glue-factories, etc.); the chemical action of certain substances which are continuously inhaled (chlorinated lime).

Hallucinations of smell (Parosmia) occur in psychoses, migraine, tic douloureux, epilepsy (aura), tabes, hysteria. Sometimes parosmia occurs as an anomaly in perfectly well persons. A former patient of mine found the odor of the wood-violet unbearably offensive, and would faint if obliged to inhale it. The hallucinations are almost universally of a disagreeable character.

Hyperosmia or increased sensitiveness of smell is found in hysteria and insanity.

Treatment.—This in all cases must be directed to the primary cause. If due to peripheral causes, the application of the faradic or galvanic current to the nasal cavity may prove helpful. If not of central origin, recovery may take place spontaneously. In testing the sense of smell, the tests must be applied to one nostril at a time. Substances which may irritate the trigeminus (smelling-salts, snuff, etc.) must be avoided; the essential oils are free from this objection. A rhinoscopic examination should always be made.

DISEASES OF THE OPTIC NERVE.

LESIONS OF THE RETINA.

Changes in the retina are especially important in albuminuria, leukæmia, anæmia and syphilis. Hæmorrhages indicate retinitis; they are at first bright-red, then black; they follow the course of the vessel or are seen in the layers of the nerve fibres. Opacities are the result of inflammatory exudation, fatty degeneration, or sclerotic changes. There is frequently cloudiness or turbidity from the effusion of serum in the layers of the retina. Atrophy of pigment or tubercular, and other, new formations give rise to white spots on the choroid. The retinal changes occurring in the course of albuminuria (*albuminuric retinitis*) are important. Disturbance of vision is one of the earliest symptoms. Gowers recognizes an inflammatory and a degenerative form. In the former the retina is greatly swollen, the arteries are obscured, and hæmorrhages are numerous. In the degenerative form there are small white spots chiefly about the macula, linear and flame-shaped hæmorrhages, and sometimes diffuse opacity. Occasionally the optic

nerve chiefly is involved, while the retina may almost escape or, again, present all the signs of severe inflammation. In diabetes the changes are similar. In profound anæmia retinal hæmorrhages are common, a neuro-retinitis less frequent. *Leukæmic retinitis* is characterized by the presence of yellowish-white spots which are almost pathognomonic; there is also turbidity and hæmorrhage. Hæmorrhages occur in purpura, scurvy and chronic lead-poisoning.

Functional Disturbances of the Retina are chiefly of toxic origin. Here belong the sudden and transient blindness of uræmia or of lead-poisoning, and the cases in which amaurosis, often persisting for months, follows toxic doses of quinine; also the amaurosis of tobacco-poisoning, the latter amounting to dimness of sight rather than blindness. Hysterical amaurosis, night-blindness (nyctalopia) and hemeralopia (dimness of vision with bright light, natural or artificial) and retinal hyperæsthesia come under this heading.

LESIONS OF THE OPTIC NERVE.

Papillitis, sometimes called *Optic Neuritis* or *Choked Disk*. Von Graefe considered it the result of venous engorgement caused by mechanical obstruction to the return flow of venous blood; more recent observers attribute its occurrence to compression of the optic nerve in its passage through the lamina cribrosa of the sclerotic; Stephen Mackenzie points out that its appearance as an occasionally unilateral affection on the side opposite to the seat of the brain tumor with which it is associated tends to show that it is the outcome of a descending neuritis following the course of the nerve-fibres. The pathological changes in the disk consist of blurring, with increase of the rosy tint of the surface. There is then swelling, opacity, loss of natural form of the disk, striation, hæmorrhage. The veins are enlarged and gorged with blood; the arteries are narrow. There may be retinitis (neuro-retinitis). Unless recovery gradually takes place, as is the rule in the mild form, there is great swelling and exudation, so the disk appears very prominent, with striations, hæmorrhages, and patches of inflammatory exudation, eventually resulting in atrophy.

Papillitis occurs chiefly in connection with intracranial

tumor, regardless of location or character. In the course of tumor, temporary increase of its size, with consequent increased compression of vessels or brain substance, may occasion sudden spells of blindness which pass away after some hours or days, described by H. Jackson as "epileptiform amaurosis." Papillo-retinitis may occur in tubercular meningitis, more rarely in cerebro-spinal meningitis; it is a feature of chronic brain-disease of childhood. The remedies most likely to be useful are: BELLADONNA, PHOSPHORUS, NUX, PULSATILLA.

Atrophy of the Optic Nerve may, as a primary atrophy, be idiopathic or occur in spinal disease (especially locomotor ataxia, lateral sclerosis, paralysis of the insane). Occasionally it is due to syphilis, alcohol, lead-poisoning, excessive use of tobacco, sexual excesses, etc. As a secondary affection it follows papillitis (*consecutive atrophy*). Loss of sight varies from slight disturbances to blindness. The perception of colors is in many cases altered. In the main, the prognosis is bad.

LESIONS OF THE CHIASM AND TRACT.

The characteristic expression of these lesions is *hemianopsia* (or hemianopia) or loss of vision in one-half of the visual field in one or both eyes. Many forms are recognized, according to the peculiar distribution of the blindness in individual cases. Thus, lateral hemianopsia means blindness in the nasal half-field of one eye and the temporal half-field of the other; temporal hemianopsia, loss of vision in the temporal halves of the visual field; nasal hemianopsia, destruction of the nasal half-field of vision, etc., etc. The explanation of the special phenomena in each form are found in the arrangement of the visual tract in the brain, in the partial decussation of the optic nerves at the chiasm and commissure, and the relation of certain nerve fibres to the retina. Theoretically hemianopsia is of particular interest because it affords a pointed application of the principles of cerebral localization. The tests necessary to determine the exact seat of the lesion are not easy, and should be made by specialists. The phenomenon may occur as a functional disturbance in migraine and hysteria, but in the permanent form must be considered a symptom of structural changes in the visual tract.

AFFECTIONS OF THE MOTOR NERVES OF THE EYE.**THIRD NERVE.**

The third nerve by its superior branch supplies the levator palpebræ superioris and the superior rectus; by its inferior branch, the internal and inferior recti and the inferior oblique muscles. It also supplies the ciliary muscles and the constrictor of the iris. Affections of the nerve may be of the centre or of its course, and may express themselves in paralysis or spasm.

Paralysis.—Nuclear lesion of the third nerve may cause general ophthalmoplegia; if that portion of the nucleus only is involved which presides over the iris, there will be loss of reflex (Argyll-Robertson pupil). Involvement of the nerve-trunk (by compression, as from exudation, aneurism or gummata, or by inflammation, as in diphtheria) is followed by symptoms of which external strabismus, double-vision and ptosis are the most important. If the affection of the nerve be partial, the paralysis will be correspondingly limited; thus, involvement of the ciliary branch alone is followed by paralysis of the iris and loss of power of accommodation. Exceptionally, recurring paralysis of this nerve has been observed, usually in women of a neuropathic disposition; such attacks rarely last more than a few days, and recur at varying intervals.

Ptosis may be a congenital defect, with a hereditary predisposition to it; occasionally it is seen, in a transient form, in delicate and neurotic women, frequently occurring in the early morning. It may arise from lesion of the third nerve at its nucleus or along its course, often associated with paralysis of all the muscles controlled by the third nerve; or it may occur alone, evidently the result of cerebral lesion not yet localized; or it is observed in connection with paralysis of the cervical sympathetic, with vaso-motor disturbances; or it may constitute a feature of the facio-scapulo-humeral type of muscular atrophy, in which case the ptosis is bilateral.

Paralysis of the ciliary muscle (cycloplegia) may occur in one or both eyes. It is usually of nuclear origin and is seen in diphtheria and locomotor ataxia. The paralysis results in loss

of power of accommodation, especially affecting near sight. In diphtheritic paralysis it occurs often and early.

Paralysis of the iris (iridoplegia) may affect the power of accommodation (*accommodative iridoplegia*), the pupil not contracting when focusing the eye upon near or distinct objects in the same line; or it may assume the form of a reflex iridoplegia in which the pupil does not contract to bright artificial light. Retention of power of accommodation with the loss of iris reflex to light constitutes the Argyll-Robertson pupil. Iridoplegia is commonly associated with smallness of the pupils. Erb has pointed out that the skin-reflex (dilatation of the pupil from irritation of the skin, especially on the neck) is usually lost with the reflex contraction.

Anisocoria or inequality of the pupils is seen in general paralysis of the insane and locomotor ataxia; it may occur in persons in good health.

FOURTH NERVE.

Nuclear paralysis of this nerve may be a feature of involvement of oculo-motor centres. Compression of the nerve (aneurism, tumor, inflammatory exudate) causes paralysis of the superior oblique, with defective downward and inward movement of the eye-ball and double-vision upon looking downward.

SIXTH NERVE.

This nerve supplies the external rectus; paralysis of the nerve (from tumors, meningeal lesions, cold) results in internal strabismus with double vision on looking towards the paralyzed side. Involvement of the nucleus causes, in addition to the paralysis of the external rectus, inability of the internal rectus of the opposite side to turn that eye inward. "As a consequence of this, the axes of the eyes are kept parallel, and both are conjugately deviated to the opposite side, away from the side of the lesion. The reason of this is that the nucleus of the sixth nerve sends fibres up in the pons to that part of the nucleus of the opposite third nerve which supplies the internal rectus: we have thus paralysis of the internal rectus without the nucleus of the third nerve being involved, owing to its receiving its

nervous impulses for movement from the sixth nucleus of the opposite side. As the sixth nucleus is in such close proximity to the facial nerve in the substance of the pons, it is frequently found that the whole of the face on the same side is paralyzed, and gives the electrical reaction of degeneration, so that with a lesion of the *left* sixth nucleus there is conjugate deviation of both eyes to the *right*, i. e., paralysis of the left external and the right internal rectus, and sometimes complete paralysis of the *left* side of the face." (Bevoor.)

OPHTHALMOPLEGIA.

An ocular palsy of nuclear origin (degenerative changes) giving rise to gradual, sometimes rapidly progressing, paralysis of all the ocular muscles or of the external or internal groups alone. It occurs nearly always in association with bulbar paralysis, locomotor ataxia, general paralysis, or progressive muscular atrophy; some authors connect it with syphilitic disease.

In the external form (*O. externa*) the paralysis begins in the levators of the eye-lids, extending to other muscles so that the eye eventually becomes fixed and objects out of a straight line can only be seen by turning the head. Ptosis is common; there may be slight protrusion of the eye-ball. The internal form involves the ciliary muscle and the iris; it rarely occurs alone. According to O'Conner, the favorite remedies at the New York Ophthalmic Hospital, for paralysis of the muscles of the eye-ball, are AGARICUS, GELSEMIUM and PHYSOSTIGMA, with CAUSTICUM and CONIUM in isolated ptosis and in ciliary muscle paralysis.

Acute ophthalmoplegia (polioencephalitis superior acuta) is sudden in onset and rapid in development. Headache, vertigo, vomiting, delirium or somnolence are swiftly followed by paralysis of the muscles of the eye. There is usually rapid pulse, normal temperature, sometimes ataxic gait, optic neuritis, with death in one or two weeks. Cases have occurred in chronic alcoholism, after infectious disease (influenza), from poisoning by spoiled sausage, carbon monoxide, and nicotine.

SPASM OF THE OCULAR MUSCLES.

Nystagmus consists of bilateral and, usually, horizontal rhythmical movements; in the unilateral form the movements are more liable to be vertical. The pathology of the affection is in doubt. It occurs in cerebral affections associated with blindness, and in sclerotic and chronic cerebro-spinal lesions, in albinism, miners, and sometimes in affections of the sympathetic nervous system.

Convulsions of the eye may be hysterical; in such cases the eyes are usually strongly drawn up. Tonic, more rarely clonic, spasm may occur in basilar brain disease.

Occasionally spasm of the levator palpebræ is seen; also rhythmical contraction and dilatation of the iris (*hippus*).

Conjugate deviation of the eyes (and head) consists of a movement of the eyes to one side by spasm of the external rectus of one eye and the internal rectus of the other, and of the sterno-mastoid muscle on the side opposite to the direction of the movement. It occurs in cerebral lesions, especially early in hemiplegia.

LESIONS OF THE FIFTH NERVE.

Paralysis may occur from hæmorrhage in organic disease of the pons, injury at the base of the brain (meningitis, caries, rarely fracture) or compression of any of its branches by tumors or aneurism.

Symptoms.—There is anæsthesia in the parts supplied by the nerve, i. e., one-half of the face and head, preceded by numbness and tingling, with loss of smell and taste (in the anterior two-thirds of the tongue; not a constant symptom). Diminution of the lachrymal, salivary and buccal secretions; swelling of the gums on the affected side; looseness of the teeth; herpetic eruptions, especially in the region supplied by the upper branch, often accompanied with severe pain. Inflammation of the eye, with opacity of the cornea and, finally, corneal ulceration. The motor symptoms consist of loss of power in the muscles of mastication on the affected side.

Spasm of the Muscles of Mastication.—Trismus may occur as an independent affection, but usually is associated with gen-

eral convulsions. When the spasm is *tonic*, there is complete closure of the jaws, so are they opened only by force and at times with extreme difficulty (*Lock-jaw*). This symptom is seen in tetanus, rarely in tetany or hysteria. It may arise from exposure to cold, caries of the jaw or teeth, or from central cause. *Clonic* spasm of the jaw consists of a single, forcible contraction (in chorea) or of rapidly repeated contractions, like chattering of the teeth.

Neuralgia of the trigeminus is discussed elsewhere (see "*Neuralgia*").

LESIONS OF THE FACIAL NERVE.

Paralysis of the seventh nerve (*Bell's Palsy*) may result from lesions in the cortex (supranuclear paralysis), from lesions of the nucleus itself (nuclear paralysis), or from involvement of the nerve-trunk (infranuclear paralysis).

Supranuclear paralysis is the result of organic disease (tumors, abscess, chronic inflammation, degeneration) in the region of the internal capsule, and is nearly always associated with hemiplegia, the paralysis of the face and the hemiplegia occurring on the same side. The peculiarities of this form are: persistence of normal electrical excitability of nerves and muscles and escape of the orbicularis palpebrarum and frontalis muscle. *Nuclear* paralysis is due to tumors, softening or hæmorrhage involving the nerve-centre; it sometimes occurs in diphtheria and in anterior polio-myelitis. *Infranuclear* paralysis may be due to exposure to cold (neuritis within the Fallopian canal), syphilis (early in second stage), disease of the ear (otitis media, with caries), blows and injuries to the nerve at its point of emergence from the styloid foramen. Should the involvement of the nerve occur before it makes its exit from the pons, the lesion being in the lower section of the pons, *cross-paralysis* occurs; i. e., the face is involved on the same side as the lesion, while the hemiplegia is on the side opposite to the lesion; *per contra*, the lesion being in the upper division, the paralysis of both face and limbs is on the side opposite to the lesion, and only the lower fibres of the facial nerve are involved.

Symptoms.—The paralysis usually begins suddenly; when

there are prodromata, they consist of abnormal sensations of taste, slight ringing in the ears, and vague pains about the face and ear.

The paralysis involves the entire half of the face, save in the supranuclear form, as already stated. The affected side of the face is relaxed, utterly motionless, void of expression, without a wrinkle. The eye cannot be closed; when the attempt to do so is made, the upper lid sinks down from its weight, and the eye is turned upward, covering the pupil, but leaving a large space between the eye-lids (*lagophthalmus*); the eyes "water" freely, and conjunctivitis and more serious inflammatory troubles of the eye result from exposure to dust and other irritating substances. The corner of the mouth on the affected side droops; the upper teeth cannot be shown, because the angle of the mouth cannot be raised; it is impossible to smile or to laugh; when attempting to drink, fluid escapes from the mouth because it cannot be perfectly closed; he cannot whistle or form labial sounds in speaking; when eating, the food collects on the affected side. The tongue, when protruded, appears to be drawn toward the affected side; in reality it is in the median line. Taste is not affected when the involvement of the nerve is outside the skull. Disturbances of hearing are frequent, but are often due to previously existing disease of the ear. In some cases there is sensitiveness to loud sounds and to low notes, which is attributed to paralysis of the stapedius muscle. Reflex movements and the power to wink or to wrinkle the forehead are lost. The face may be swollen on the affected side and there may be herpetic eruptions. Pain is not common.

The duration is variable.

The prognosis is good in cases due to cold and syphilis. Recovery may occur when the paralysis results from injury; the case is less hopeful when there is disease of the middle ear; it is practically hopeless in the presence of serious organic lesions. Erb considers the prognosis good, and recovery in from fifteen to twenty days assured, when the electrical reactions are normal. When there is only lessening of the electrical excitability of the nerve, and that of the muscle is increased to the galvanic current, and the contraction sluggish, recovery will probably take place in four to six weeks or may be delayed for from eight

to ten weeks. When there is reaction of degeneration and the mechanical excitability is altered, the prognosis is relatively unfavorable, and recovery may not take place for from two to eight months, or even for twelve or fifteen months.

Treatment.—The application of cotton-wool to the face serves to retain heat, and, if employed early, may accomplish much good. Both blistering and the thermo-cautery are advised; of the two, the latter is to be preferred. Pains should be taken to protect the eye by closing it, using strips of adhesive plaster or a bandage. If the eye is allowed to be kept open during the day, in the house, a bandage should be used during sleep. The remedies which are oftenest useful are RHUS TOXICODENDRON (rheumatic tendency, from exposure to wet), ACONITE (in recent cases, from exposure to cold), CAUSTICUM (right side; twitchings of affected muscles), GELSEMIUM (diphtheria, pain in the face, twitching of muscles), SILICA, HEPAR SULPHUR and AURUM in connection with middle-ear disease, BELLADONNA, RUTA, HYPERICUM (traumatism), KALI HYDRIODICUM (syphilis), ARSENICUM, IODUM.

In due time massage and electricity may be used. A mild galvanic current (positive pole behind the ear, negative pole over the muscles) should be used daily, each sitting not to exceed fifteen minutes.

Spasm.—Excluding the habit spasm of children, elsewhere considered, the form here discussed is the simple facial spasm occurring as a primary affection or following paralysis. The disease usually occurs in adults. It sometimes depends upon a brain-lesion, frequently cortical; sometimes it is the result of pressure at the base of the brain from tumor or aneurism. The spasm usually first attacks the orbicularis palpebrarum and the zygomatics, causing rapid contraction of the muscles about the eye (blepharospasm), sometimes tonic contraction. When the lateral facial muscles are involved, there is twitching of the side of the face with incomplete closure of the eye. Sometimes the muscles of the lower face suffer severely, especially the depressors of the angle of the mouth. A number of these spasms occur with lightning-like rapidity, after which there is a rest, soon to be broken by a renewal of the spasms. The affection may be unilateral or bilateral; it is aggravated by great exhaustion, involuntary movements of the face, and emotional

excitement. There is rarely much pain, but tender points have been observed, especially in the supraorbital branch of the fifth nerve. The prognosis is doubtful so far as a cure is concerned.

Treatment includes a thorough search for the primary cause and attempts at its removal. All kinds of treatment have been employed, without even reasonable success. Weir-Mitchell reports one cure by the daily use of the rhigolene spray. Galvanism is praised, but, so far as my knowledge extends, no cures are reported. Surgery has accomplished nothing. I have seen good results follow the use of *IGNATIA 1x* in the case of a man who had for some years suffered from ataxic symptoms.

AUDITORY NERVE.

Affections of the auditory nerve are rarely of cortical origin. It is known that destruction of the first temporal gyrus causes word-deafness. Degenerative changes of the nerve fibre after it has left the cortical centre, whether originally from tumor, inflammatory affections, hæmorrhage or other causes, may result in deafness. A primary degeneration of the nerve may occur in locomotor ataxia, and serious involvement of it is common in cerebro-spinal meningitis. The general practitioner deals almost exclusively with disturbances of hearing which result from lesion in the labyrinth, in the greater number of cases due to disease of the middle ear.

Increased function (hyperæsthesia and irritation) may assume the form of *hyper-acusis* or abnormal sensitiveness to sound, as seen in hysteria and brain-disease, and as is illustrated in the special sensitiveness to low notes arising from paralysis of the stapedius. The term *dysacusis* is used to cover that abnormal sensitiveness to all sounds which is common in conditions of weakness with nervous irritability, as seen in nervous headaches. Irritation may also give rise to whistling, whirring, ringing, roaring noises in the ear; this subjective sensation is called *tinnitus aurium*. It may be caused by circulatory disturbances, disease of the middle ear, or wax on the drum, and may be artificially produced by sudden stimulation of the nerve. It is sometimes a constant symptom and the cause of great distress, as in the insane. It is often present in migraine, and may constitute an epileptic aura. A continuous

murmur or bruit may be present in anæmic and neurasthenic states.

Diminished function causes partial or complete deafness, which must not be mistaken for the deafness arising from such disease of the middle or even external ear as prevents the conduction of sound to the cochlea. The differentiation between these two forms of deafness (i. e., deafness from disease of the ear and nerve-deafness) depends upon tests made with the tuning-fork. If bone-conduction is materially lessened or lost, the auditory nerve or its endings is at fault; if the sound becomes distinctly audible when the tuning fork is applied to the mastoid bone, when it could not be heard at the outer ear, there is disease of the middle or outer ear.

Auditory vertigo is common with diseases of the ear. The term *Menière's Disease*, at one time restricted to special forms of auditory vertigo, is now applied to all cases of sudden vertigo, accompanied with noises in the ears and deafness.

Symptoms.—The onset is sudden. There is all at once a sense of extreme fulness in the ear, accompanied by loud noises; often shrill and whistling, with a sensation as if one were turning rapidly and would fall, or as if objects about him were turning, or both. The attack may be initiated with a sensation as though he had received a violent blow behind the ear, and he may actually fall to the ground. There may be mental confusion or momentary loss of consciousness. Pallor of the face, sense of extreme weakness, with nausea, vomiting, and profuse clammy sweating of the forehead and face follow quickly. The attack is accompanied with more or less deafness of nervous origin and, occasionally, convulsive movements of the eye-ball (nystagmus). The paroxysms recur at varying intervals; there may be several in a day or they may be weeks or months apart. They may grow in severity as the case becomes fully established; in bad cases the vertigo may become almost constant. Usually the vertigo ceases after the labyrinthine nerve organs have been destroyed, a condition which necessarily results in complete deafness. The affection is rare in youth, and is oftenest seen in men who have passed their fortieth year.

The *cause* of aural vertigo is still in doubt. By some it is considered an affection of the labyrinth, giving rise to disturbances of the equilibrium; others think it is due to an involvement of

the centres which preside over hearing and equilibration; still others believe that the real cause lies in disturbed vaso-motor influences, causing variations in the intra-labyrinthine pressure.

The diagnosis of aural vertigo rests upon the presence of noises in the ear and other evidence of the disturbance of the auditory nerve at the commencement of the attack. Differentiation from epilepsy may be difficult, especially when the epileptic seizure is preceded by an aura which presents tinnitus, vertigo, and nausea.

Treatment.—**GLONOINE** when the "sense of fulness" in the ear and head is marked, with throbbing, roaring, shrieking noise in the ear.—**CHININUM SULPHURICUM**. The noise in the ears excludes every other sound. In anæmic, debilitated persons.—**AURUM**. Tension in the ears, with tinnitus and deafness; in the eyes, with dimness of sight. Nervous palpitation. Staggers as though drunk, with tendency to fall toward the left side.—**SALICYLIC ACID**. Tendency to fall to the left; surrounding objects move toward the right.—**PETROLEUM**. Vertigo felt chiefly in the occiput, with great nausea; deafness; sensation as if the ears were filled with water.—**CAUSTICUM**. Ringing in the ears; sense of weakness and anxiety; everything turns in a circle; cracking and snapping sounds in the ear when he turns the head; reverberation of sounds in the ear, even of his own voice. Tendency to excessive accumulation of wax in the ear.—**LEDUM**. Ringing noise in the ear; roaring sound, as of wind, in the ear; cannot hear well; feels as though there were cotton in the ear. Vertigo, with tendency to fall forward.—**TABACUM**. Vertigo, with nervous deafness, great weakness, sense of oppression and anxiety, dilated pupils, pale face covered with profuse cold sweat, and deathly nausea.—**GELSEMIUM**, **CAUSTICUM**, **DUBOISIA**, **ARNICA**, **FERRUM** and **KALI BROMATUM** should also be consulted.

GLOSSO-PHARYNGEAL NERVE.

Very little is known of the functions of this nerve. They are probably of a mixed character; affections of this nerve, alone, are scarcely demonstrable. It was thought that disturbances of taste result from loss of function of the glosso-pharyngeal,

but Gowers positively denies this, attributing this symptom to disease of the root of the fifth nerve.

Ageusia or loss of the sense of taste may result from disturbance in the peripheral end organs, in the mucous membrane of the tongue, as seen in fevers ("dry" tongue) and dyspepsia ("furred" tongue); from the action of local irritants (pepper, mustard, vinegar, etc.); and from involvement of the root of the fifth nerve.

Parageusia or perversion of the sense of taste is rare, save in hysterics and the insane. *Hallucinations* of the sense of taste are observed in insanity and in the aura of epilepsy.

PNEUMOGASTRIC NERVE.

Pharyngeal Branches.—The pharyngeal plexus of nerves is formed by branches of the pneumogastric and glosso-pharyngeal. Paralysis of the parts supplied results from involvement in the nuclei (bulbar paralysis) or of the nerves (neuritis). It gives rise to difficulty of swallowing (dysphagia); particles of food often enter the larynx or nares. The paralysis may be unilateral or bilateral; if the former, the effects are comparatively trifling. Functional irritation of the nerves causes spasms of the pharynx, as observed in hysteria and hydrophobia.

Laryngeal Branches.—Paralysis affects the abductors or the adductors; the former may be bilateral or unilateral.

Bilateral paralysis of the *abductors* results from cold or laryngeal catarrh; it is seen in hysteria and as a central affection in tabes and bulbar paralysis. The cords are in close apposition, and their failure to separate during inspiration is responsible for the whistling, noisy stridor which accompanies the effort. The condition is dangerous, since a very slight degree of additional swelling of the parts would cause asphyxia. The voice is not affected. *Unilateral abductor paralysis* is due to involvement of one recurrent nerve (tumor, aneurism, etc.). The cord on the affected side does not move during inspiration. In *total* bilateral or unilateral palsy the cords on one or both sides are moderately abducted and perfectly motionless. The power to cough is lost; there is aphonia and stridor on deep inspiration in the bilateral form, and hoarseness of voice with

slight stridor on deep breathing in total unilateral palsy. Neither voice nor inspiration are materially changed or embarrassed.

Adductor paralysis is characterized by inability to bring the cords together on attempts at phonation, though their position is normal and they move in respiration; hence, the striking symptom produced is loss of voice (aphonia). It is seen in severe laryngeal catarrh, after excessive use of the voice, and in hysteria.

Spasm of the muscles of the larynx is seen in laryngismus stridulus and in the laryngeal crises of locomotor ataxia. The term spastic aphonia refers to the occurrence of a laryngeal spasm when an attempt is made to speak, preventing phonation.

Sensory disturbances of the larynx are rare. Anæsthesia occurs in diphtheritic neuritis and bulbar paralysis, sometimes in hysteria. The condition is one of considerable danger, as it may give rise to the entrance of particles of food into the trachea.

Cardiac Branches.—Inhibition and control of the action of the heart is carried on by fibres which pass in these branches. Irritation of these fibres slows the action of the heart. Complete paralysis, on the other hand, abolishes the inhibitory influence and is followed by excessively rapid action of the heart.

Disturbances of *sensation* are described elsewhere. (See "Neurosis" of the heart).

Pulmonary Branches.—Little is known concerning their function; asthma is considered a neurosis of these fibres.

Gastric and Œsophageal Branches.—These furnish a large portion of the motor supply to the stomach and are concerned in the act of vomiting, as a reflex action or as the result of direct irritation (meningitis). Irritation of the sensory fibres causes gastralgia; all the gastric neuroses are closely associated with pneumogastric disturbances. The gastric crises of locomotor ataxia are the result of central irritation of the nuclei. It is thought that the sensation of hunger is caused by the pneumogastric. Œsophageal spasm may be a reflex phenomenon, may be very painful, and resemble stricture; it occurs not infrequently as a manifestation of hysteria.

SPINAL ACCESSORY NERVE.

Paralysis.—It must be borne in mind that the *internal*, smaller part of the spinal accessory joins the pneumogastric and helps supply the laryngeal muscles; paralysis of this branch is discussed with the affections of the laryngeal branches of the pneumogastric. Disease or compression of the *external* portion causes paralysis of the sterno-mastoid and of the trapezius on the same side. Paralysis of the sterno-mastoid gives rise to difficulty of rotating the head to the opposite side, but not to true torticollis. Paralysis of the trapezius is not complete, for it is in part supplied from the cervical nerves. This partial paralysis is recognized by a change in the contour of the outer side of the neck, which from a nearly straight line changes to a concave curve, which becomes very apparent when the patient draws a deep breath. The loss of power in the middle portion of the trapezius causes slight drooping of the shoulder, rotation inward of the angle of the scapula, and impairment of the power to raise the arm. When there is bilateral paralysis of the sterno-mastoids, the head has a tendency to fall backward; when of the trapezius, it falls forward. These bilateral forms may occur in progressive muscular atrophy.

Accessory Spasm (Torticollis; Wry Neck).—Wry neck is caused chiefly, but not exclusively, by spasm of cervical muscles which are supplied by the accessory nerve.

Congenital (or fixed) wry neck occurs in children, usually affects the right side, and often is not noticed until the child is several years old. It depends upon shortening of the sterno-mastoid, which feels hard and firm. The affection is associated with a strong tendency to facial asymmetry. Its causation is in doubt; it had been considered the result of intra-uterine injury of the affected muscles or of violence done during parturition; Golding-Bird claims that both torticollis and the facial asymmetry are of central origin. The treatment is simple and effective; it consists of tenotomy; unfortunately the facial asymmetry is more readily noticed after, than before, the operation. *Spasmodic* wry neck is tonic or clonic, exceptionally both. It occurs in adults, in men oftener than in women. In the tonic form, when the sterno-mastoid is at fault, the occiput

is drawn toward the shoulder of the affected side, elevating the chin and rotating the face upward and toward the other shoulder. When the trapezius also is involved, the occiput is still more strongly drawn toward the affected side. The affected muscles are rigid, and in prolonged cases there may be spinal curvature, with the convexity toward the sound side. In the clonic form several muscles may be involved, the sternomastoid nearly always. The head usually is drawn somewhat backward; the head may be rotated so that the mastoid approaches the inner end of the clavicle, raising the chin and turning the face to the opposite side. The trapezius, splenius capitis, platysma myoides, and other muscles, may be involved. In the rare cases of bilateral spasm a strong backward movement results which may make the face assume a horizontal position, looking upward. The contractions may occur suddenly or there may first be some stiffness and pain in the neck; they recur at very brief intervals and usually are accompanied with pain and sense of great muscular fatigue. They cease during sleep. There may develop in time hypertrophy of the affected muscles. Neither causation nor pathology are understood. The neuropathic tendency seems clearly pronounced in some cases; violent emotions, excitement and fatigue exaggerate the difficulty. The course is tedious and the prognosis not encouraging; occasionally recovery takes place, but often improvement is merely temporary.

Treatment.—Mechanical devices are of slight benefit and surgical methods so far proposed have accomplished nothing. Galvanism (positive pole over the motor points of the affected muscles, the negative pole to the periphery) has given relief in some cases. In the so-called “rheumatic” cases faradism and the application of dry heat (“hot ironing of the muscles”) deserve faithful trial.

ACONITE, BRYONIA, RHUS, GELSEMIUM, CICUTA, NUX VOMICA, STRYCHNIA and BELLADONNA should be studied.

HYPOGLOSSAL NERVE.

The hypoglossal nerve supplies the muscles of the tongue and the genio-hyoid muscle. *Paralysis* may result from bulbar disease, lesions of the cortex, nuclear degeneration, degenera-

tion of the nerve itself, compression from exudation, tumors, etc. The *Symptoms* of involvement of one hypoglossal are unilateral paralysis and marked atrophy of the tongue. The tongue, when protruded, turns toward the affected side. There are fibrillary twitchings of the muscular fibres and slight impairment of articulation. When bilateral (in bulbar paralysis; sometimes in progressive muscular atrophy), the tongue lies motionless on the floor of the mouth, rendering speech and mastication, and in part deglutition, very difficult. It is atrophied when the seat of the disease is below the nuclei. The seat of the lesion can usually be determined; when supranuclear, there is hemiplegia and no atrophy of the tongue; nuclear lesion, furthermore, is usually bilateral. Involvement of the fibres of the nerve within the medulla after they have left their nuclei may result in paralysis on one side of the tongue with paralysis of the limbs on the opposite side; the tongue, when protruded, is turned toward the sound side.

Spasm of the tongue is rare. It occurs in chorea, epilepsy, spasm of the muscles of the face, and in hysteria. Cases of paroxysmal clonic spasms are on record in which the tongue is rapidly thrust forward and back forty, and more, times a minute. They usually recover.

DISEASES OF THE SPINAL NERVES.

CERVICAL PLEXUS.

Occipito-cervical neuralgia. (See article on "Neuralgia").

Affections of the Phrenic Nerve.—*Paralysis* may result from lesions in the anterior horns at the level of the third and fourth cervical nerves, from compression of the nerve, and from neuritis; it is usually bilateral. The result is paralysis of the diaphragm. When the paralysis occurs suddenly, there may be temporary, but severe, dyspnoea and lividity. Otherwise the resulting disturbances are not great, since the abdominal muscles at once assume extra work. Upon exertion, dyspnoea is common. In case of bronchitis occurring simultaneously, the condition is dangerous on account of the added respiratory embarrassment and the great difficulty of coughing, thus favoring the accumulation of mucus in the tubes. Unilateral paralysis rarely gives rise to marked symptoms, but its existence may be

recognized from the inequality in the descent of the diaphragm on the two sides, the descent being less on the affected side. The prognosis is always serious.

Spasm of the diaphragm may be tonic or clonic. *Tonic* spasm is rare; it occurs nearly always in connection with tetanus, and is exceedingly dangerous. Relief must be afforded within a very few minutes, and to this end hot fomentations and inhalations of chloroform are advised. *Clonic* spasm (*hiccough*; *singultus*) is of common occurrence. It consists of intermittent, sudden contractions of the diaphragm which rarely persist long and are not accompanied with pain. Exceptionally they are remarkably persistent, continuing for many days, and even weeks; in such cases all measures of relief may fail. A recent writer groups the cases into (a) *inflammatory*, chiefly seen in affections of the abdominal viscera and in severe forms of typhoid fever; (b) *irritative*, as from swallowing very hot substances; diseases of adjacent structures and gastric and intestinal disorders, more especially those associated with flatulency; (c) *specific* or *idiopathic* cases, in which there was no evident cause, but usually occurring with gout, diabetes or chronic nephritis; (d) *neurotic* cases (hysteria, epilepsy, shock, tumor).

Treatment.—In light cases, common household measures, as holding one's breath, or drinking water, are usually quite sufficient. In serious cases, ice, salt and vinegar, or salt and lemon-juice may be tried. Lavage has been used successfully in cases of gastric origin. Good results are claimed for the faradic brush freely employed over the diaphragm. Apomorphia (gr. $\frac{1}{20}$), hypodermically, will cause copious emesis and may in a case of hysterical hiccoughing end the trouble. PILOCARPINE, AMYL NITRITE and NITRO-GLYCERINE are recommended. Bartlett advises the study of IGNATIA, NUX VOMICA, CICUTA, STRAMONIUM, ARSENIC, PULSATILLA, HYOSCYAMUS, VERATRUM ALBUM and KREOSOTE. My own experience in nearly thirty years of active work embraces seven cases of unmanageable "hiccough," two of them in old persons, one continuing for eleven days. Two cases passed out of my hands; of the other five cases one died; one recovered after routine treatment embracing nearly every measure to be thought of; one was temporarily relieved by IGNATIA and ASA FŒTIDA, but began to gain and

recover promptly under MOSCHUS 2x; two received nothing but MOSCHUS, without other attempts at relief, save bits of ice to relieve thirst, followed by improvement and recovery.

BRACHIAL PLEXUS.

This plexus of nerves supplies the muscles and skin of the upper extremities. All the nerves, or any of the nerves, composing the plexus may be involved in disease and cause paralysis of the parts supplied; hence the paralysees here studied depend upon involvement of the entire plexus of nerves or upon lesions of the individual nerves of the plexus.

Combined Paralysis.—The usual causes of paralysis are operative here, of which compression of the nerve trunk and injuries are the most common; neuritis is rare. If the latter exists, it nearly always ascends from the periphery, gradually involving the entire limb. Injuries and blows on the neck frequently cause partial paralysis of the arm; here may be classed injuries occasionally received by the foetus during parturition. The most serious, and probably most common, form of combined paralysis is the result of luxation of the humerus, particularly the subcoracoid form, especially so when the luxation is not recognized, hence not reduced; the prolonged pressure upon the nerves results in permanent paralysis, with muscular wasting, reaction of degeneration, and trophic changes in the skin. Sometimes complete paralysis results from a fall or a blow upon the shoulder, seriously bruising the nerves, or from a dislocation of the humerus, though promptly and skillfully set.

Long Thoracic Nerve.—This nerve supplies the serratus magnus. Paralysis of this muscle (*serratus palsy*) may result from neuritis due to exposure or, much more frequently, from injuries in the posterior triangle of the neck, as from working "overhead" ("white-washing") or from pressure in carrying heavy burdens. It may occur in poliomyelitis and in progressive muscular atrophy. There may be neuralgic pain, especially during the onset. The paralysis is easily recognized when the arm is moved forward; the paralyzed muscle is no longer able to hold the scapula firmly to the thorax, hence the scapula on the affected side appears "winged."

Circumflex Nerve.—This supplies the deltoid and the teres minor. The usual causes are operative. When there is loss of

power in the deltoid, the arm cannot be raised; there is muscular wasting, impairment of sensation in the skin over the muscles, and flattening of the shoulder.

Musculo-spiral Nerve.—Owing to the exposed position of this nerve, paralysis here often results from injuries, blows, fractures, or from bruising the nerve in sleeping with the arm over the chair, or from prolonged use of crutches, or from sleeping, as many persons are fond of doing, with the head resting upon the arm. Rarely it results from neuritis (cold); it may be a feature of lead-poisoning. Wrist-drop and inability to extend the first phalanges of the fingers and thumb are characteristic. When the lesion is high up in the arm, the triceps, brachialis anticus and supinator longus are involved. In pressure palsy there usually is loss of power in the supinators. There often is tingling and impairment of sensation, but sensory disturbances are trifling. Pressure palsies may disappear in a few days, and eventual recovery may nearly always be expected. The treatment is that of neuritis.

Ulnar Nerve.—This nerve supplies motor power to the ulnar halves of the deep flexors of the fingers, the muscles of the little finger, the interossei, the adductor and inner head of the short flexor of the thumb, and the ulnar flexor of the wrist. The sensory fibres supply the ulnar side of the hand, two and a half fingers on the back, and one and a half finger on the front. Paralysis usually results from pressure at the elbow-joint. The hand moves toward the radial side; the thumb cannot be adducted, the first phalanges cannot be flexed, and the others cannot be extended. Long-standing cases present the "claw-hand." Loss of sensation occurs in the parts supplied by the sensory branches.

Median Nerve.—This nerve supplies the flexors of the fingers, except the ulnar half of the deep flexors, the abductor and the flexors of the thumb, the two radial lumbricales, the pronators, and the radial flexor of the wrist. The sensory fibres supply the radial side of the palm and the front of the thumb, the first two fingers and half of the third finger and the dorsal surface of the same three fingers. Paralysis results from injury, sometimes from neuritis, and is characterized chiefly by inability to pronate the forearm beyond the mid-position. The wrist cannot be flexed toward the radial side, and there is loss of power

in the members supplied by the median nerve as above indicated. Marked wasting of the muscles of the thumb is characteristic and easily noticed.

LUMBAR AND SACRAL PLEXUSES.

Lumbar Plexus.—Lesions here usually arise in connection with psoas abscess, diseases of the vertebræ, and intra-abdominal growths. Involvement of the *obturator nerve* (sometimes from injuries during parturition) results in loss of rotation outward and loss of power to cross one leg over the other. Involvement of the *anterior crural nerve* (dislocation of hip-joint, injuries, disease of the bones, psoas abscess, rarely during parturition) results in paralysis of the knee, with wasting, anæsthesia of the antero-lateral parts of the thigh and of the inner side of the entire leg. Involvement of the *gluteal nerve* results in loss of power of abducting the thigh.

Sacral plexus.—Injury to this plexus is common from inflammatory processes within the pelvis and during parturition. Neuritis also is of comparatively frequent occurrence here. Involvement of the *sciatic nerve* at or near the notch causes paralysis of the flexors of the legs and of the muscles below the knee; when the point of involvement is below the middle of the thigh, only the muscles below the knee are paralyzed. There may be wasting and trophic changes. Sensory disturbances are: anæsthesia of the outer half of the leg, sole, greater part of the dorsum of the foot. In unilateral sciatic paralysis the patient walks with the affected leg flexed at the knee. In the rare paralysis of the *small sciatic nerve* there is difficulty in raising from a seat and anæsthesia of a strip along the back of the middle third of the thigh. The *external popliteal nerve* supplies the peronæi, the long extensor of the toes, the tibialis anticus, and the extensor brevis digitorum. In paralysis of these muscles there is foot-drop and "steppage" gait. If of long standing, there is permanent extension of the foot and wasting of the anterior tibial and peroneal muscles. Loss of sensation occurs in the outer half of the front of the leg and on the dorsum of the foot. *Internal popliteal nerve.* Paralysis results in loss of plantar flexions of the foot and of flexions of the toes, loss of abduction of the foot, loss of power in the

muscles of the sole of the foot. In old cases the position is that of talipes calcaneus, the toes assuming a claw-like shape from contracture. There is anæsthesia on the outer side of the sole of the foot.

Sciatica and neuralgic affections of the nerves of the feet are discussed elsewhere. (See Neuralgia.)

VASO-MOTOR AND TROPHIC DISORDERS.

RAYNAUD'S DISEASE.

An affection—probably a vaso-motor neurosis—which is composed of three stages, a stage of local syncope, a stage of local asphyxia, and a stage of local or symmetrical gangrene.

Practically nothing is known of its *ætiology* save that it is seen oftener in persons of pronounced neuropathic tendency, especially in women, and that it occurs usually during cold weather. Slight exposure and emotional excitement may precipitate an attack.

Its pathology is uncertain. According to Raynaud, who first described this disease, the local syncope is due to contraction of the vessels, involving the arteries, veins and capillaries; the asphyxia is caused by dilatation of the small vessels, with, possibly, some spasm in the arterioles; necrosis arises from the loss of vitality of the tissues.

Symptoms.—The onset of the local *syncope* usually is sudden and painless. One or more fingers, one or both hands, one or several toes, or the tip of the nose, or the tips of the ears, become cold, bloodless and of alabaster whiteness, sometimes a faint yellow; they feel stiff, and there is a loss of power of motion. After a time the color returns, frequently with considerable pain of a shooting or pressive character, and the parts assume their normal condition, or it progresses to local *asphyxia*. This, the second, stage may also come on as the primary manifestation, and may involve any of the parts and members enumerated, including the trunk. The affected parts become livid, of a dark-purplish blue, or even black; when the finger is firmly pressed upon the cyanosed spot, the white mark thus produced remains for a long time, an evidence of the extremely sluggish capillary circulation. There is usually some swelling and often severe burning pain, with periodical and

intense aggravations. Marked anæsthesia is often present. Gradually the asphyxia passes off and the parts resume their normal state; in rather more severe cases slight loss of substance is common. Such attacks may occur often and persist for a long time without injury to the health. If recovery does not take place, as in very severe cases, the coldness and insensibility of the parts persists, the pain usually increases, small blebs containing bloody serum develop on the skin, and sloughing occurs. It is peculiar to this affection that nearly always the actual loss of substance is much less than the appearance of the involved parts would indicate. The formation of large symmetrical sloughs on the trunk or limbs, especially in children, is always to be dreaded, since they indicate the probability of a fatal issue within three or four days. In some cases the affected part, especially the fingers, toes, tip of nose or ear, become dry and mummified, a line of demarcation is formed, and the necrosed part is thrown off.

It must not be inferred that these stages appear clear-cut and successively. They merely represent different conditions which may exist at the same time in the same patient and in the same member; thus the fingers of one hand may present the features of local syncope, local asphyxia and local gangrene.

Associated with these symptoms there may be considerable malaise, loss of appetite, nausea, vomiting, colicky pain and diarrhœa. Hæmoglobinuria may be present during an attack or in regularly recurring cases may take the place of an attack; sometimes there is albuminuria. Peripheral neuritis rarely occurs in connection with symmetrical gangrene. Urticaria, erythema nodosum and scleroderma have been noticed. Marked symptoms of cerebral involvement may be present, as torpor, tinnitus aurium, deafness, dimness of vision, narrowing of the retinal arteries, periods of unconsciousness, acute mania, and delusions.

Local syncope and local asphyxia may recur for many years at stated times, proving a source of great annoyance and of considerable suffering; to these cases the term "chronic" has been applied. Chronic Raynaud's Disease does not end in gangrene.

Prognosis.—With the exception of the comparatively rare malignant type, there is slight danger to life. As pointed out,

the loss of tissue is almost insignificant in the average case as compared with the threatening character of the local symptoms which precede sloughing.

Treatment.—The affected limbs should be raised and kept wrapped in cotton-wool. Barlow advises the use of galvanism early in the course of the disease. He immerses the affected limb in a basin filled with warm salt-water, into which the negative pole is placed, the positive pole being applied over the spine. In due time thorough rubbing in olive oil should be useful. Gangrene must be treated according to surgical principles.

ACONITE, BELLADONNA and GLONOINE, SECALE, LACHESIS, CROTALUS and ARSENICUM are the remedies suggested by the totality of symptoms.

ANGIO-NEUROTIC ŒDEMA.

An affection, probably of neurotic origin, which is characterized by circumscribed œdematous swellings. It is also known as giant urticaria. A hereditary tendency appears well marked; the attacks often appear to be induced by indigestion and great mental excitement. The characteristic symptom suddenly appears as a pale, circumscribed œdematous swelling, involving the skin and the mucous membrane, preferably on the face and eye-lids, also on the nose, lips, cheek, throat, back of the hands, legs, sometimes genitalia; these swellings vary in extent from two to eight inches; at times the raised spots are small, but soon they run together and cover a large area. Occasionally they occupy corresponding areas on both sides of the body. The outbreak may be preceded by intense redness, heat, itching, or by urticaria; occasionally well marked gastrointestinal crises are observed in connection with the œdema; purpura is a rare symptom. Fatal results have followed sudden œdema in the larynx. The attack rarely lasts long, usually passing off in a few hours. The affection is, however, exceedingly obstinate and may periodically recur for many years, as, in women, at the menstrual period.

The treatment is purely symptomatic; among the remedies likely to be useful, APIS MELLIFICA is the most promising.

ACROMEGALY.

A chronic affection characterized chiefly by enlargement of the hands, feet and face. Heredity seems an important factor. The disease usually begins from the twentieth to the twenty-fifth year, rarely earlier or later than the fortieth year. Women are attacked oftener than men. It is rare in America. The pathology of acromegaly is not understood. There is evidently a true hypertrophy of the bones, which may also affect other parts, as the skin, connective tissue and blood-vessels. Exhaustive study of the affection has been made by Marie, who considers it a dystrophy which bears to the pituitary body—which has always been found hypertrophied in acromegaly—the same relation which myxœdema bears to the thyroid gland; the correctness of this view is not established.

Symptoms.—The hands and feet first begin to enlarge, the enlargement involving both the bone and the soft tissues; the wrists are markedly increased in size, but the arms are rarely affected. In the feet the big toe is especially involved; it appears large, broad, and its nail is grooved vertically. The enlargement next involves the head and face, which, on account of the involvement of the maxillary bones, especially the inferior maxillary, becomes elongated, broadened, and protruding in its lower part. The lips are thickened; the ears big and coarse; the teeth are widely separated and may drop out of the thickened alveolar process; the tongue becomes cumbersome and clumsy; the skull-bones grow thick. Gradually the bones of the trunk are involved, including the sternum, clavicle, and vertebræ, the implication of the latter resulting in marked kyphosis.

There is no infiltration of subcutaneous tissue, but the skin may become coarse and flabby. The genitalia occasionally hypertrophy. Muscular wasting is not unusual. There is frequent, and occasionally intense and continuous, headache, with dimness of vision from progressive optic nerve atrophy, and more rarely diminution of the sense of hearing and smell. In women menstrual disturbances occur early; there may be complete suppression of the menstrual flow, with extreme dullness and apathy. The duration of the disease is from ten to twenty years, death usually resulting from cachexia.

Diagnosis.—Acromegaly is to be differentiated from the osteitis deformans of Paget. In both the head is affected; but in acromegaly it is the facial, and not the cranial, bones, while in Paget's disease the cranial bones suffer most. In acromegaly the face is egg-shaped, with the large end downward; in osteitis deformans the face is triangular, with the base upward; in acromegaly the shafts of the long bones, as a rule, escape; the reverse obtains in osteitis deformans.

Marie has described under the name "*osteo-arthropathie pneumique*" an affection which in many respects resembles acromegaly. It is seen in persons suffering from lung-disease (purulent pleurisy, chronic bronchitis, new growths), and is characterized by hypertrophy of the bones of the extremities and of the shafts, enlarged and bulbous phalanges, curved nails, and curvature of the spine.

Treatment so far has proved wholly useless. O'Conner claims to have had good results from SULPHUR and SILICA.

SCLERODERMA.

A disease characterized by cirrhotic hardening of the skin and subcutaneous tissues, occurring in patches or in diffuse areas, and followed by atrophy.

The **ætiology** is unknown. By far the greater number of cases observed occurred in women. Some cases seemed connected with rheumatic complaints. Usually it is attributed to exposure to wet and cold or to the prolonged immersion of the hands in cold water. The **pathology** is indefinite. The affection is thought to be a tropho-neurosis, arising from changes in the arteries of the skin which eventually lead to connective-tissue overgrowth.

Circumscribed scleroderma (Keloid of Addison; morphœa). The disease here occurs in patches, rarely larger than the hand; the skin in the affected part is hard, leathery, and of a waxy dead white. These patches may be situated along the course of a nerve of the trunk, intercostals, lumbar, or on neck, face, or breast; often they are surrounded by a narrow pink zone of dilated vessels. Usually the appearance of the patch is preceded by hyperæmia, occasionally with pigmentation of the skin, accompanied with great itching and irritation, which

ceases after the patch has become established. Anæsthesia is not uncommon later in the disease. The skin usually is exceedingly dry. Sometimes the affection begins in a little white spot which looks like cicatricial tissue. The circumscribed forms not infrequently exist with the diffuse type in the same person.

The *diffuse* form is more likely to be ushered in with malaise and slight sensory disturbance in the parts to be affected; in due time the skin appears reddened and, usually, swollen, frequently not unlike erysipelas. After a period which varies from several days or weeks to one or two years, the skin becomes hard and tense, often with neuralgic pains in the parts, very dry, sometimes pigmented; there may be tenderness, but anæsthesia is much more common. When fully developed, the affected parts (extremities, face, the larger portion of the trunk) are encased in a hard, firm, unyielding armor of living tissue. The wrinkles have disappeared; it is no longer possible to pick up the skin or to pinch it; if the face be involved, it is smooth, without expression or power of motion; even the movements necessary to chew the food may be performed with the greatest difficulty. The joints are fixed, as though held in a vise, by the unyielding covering. There is little, if any, pain; itching is often exceedingly troublesome at first, but it wholly disappears later. This state may exist for months or years, with periods of arrested development of the disease. Recovery, however, is very rare; death is usually due to intercurrent pneumonia or nephritis.

Various diseases are so closely allied to scleroderma that they may be mentioned here. *Sclerema neonatorum* is a congenital affection or develops very soon after birth. It is characterized by areas of induration of the skin, which does not pit on pressure. It spreads rapidly and usually terminates fatally. *Œdema neonatorum* begins in the legs and rapidly invades the entire body. The skin is hard and stiff, but there is œdema of the subcutaneous tissues; hence, there is pitting from pressure and power to move the joints. Few cases recover.

Sclerodactylia consists of deformity, shortening and atrophy of the fingers, the skin becoming thickened, waxy, sometimes pigmented. There is usually great deformity of the nails.

Bullæ and ulcerations are common. A striking feature is the remarkable sensitiveness of the patient to cold.

Ainhum is a trophic lesion, peculiar to the negroes of Brazil, Africa and other tropical countries; it is confined to the toes, preferably the little toe, in which a furrow or band of indurated tissue forms in the line of the digito-plantar fold. The slowly increasing constriction eventually results in the death of the toe, which drops off, frequently without previous pain or inflammation.

The treatment of scleroderma consists largely of measures calculated to render the patient comfortable by clothing him warmly, for sensitiveness to cold is very pronounced; if possible, he should spend the winter in a southern country. Galvanism is recommended by some writers; Blocq claims to have cured a case by electrolysis. Bartlett states that the remedies adapted to these cases are BRYONIA, GUAJACUM, GRAPHITES, HYDROCOTYLE, LACHESIS, PHOSPHORUS, SILICA and STILLINGIA.

FACIAL HEMIATROPHY.

This very rare affection, usually beginning in childhood, is probably due to involvement of the trophic fibres of the fifth nerve. It consists of progressive wasting of one side of the face, including the bones and the soft tissues. It results in startling asymmetry of the two halves of the face. There is no loss of sensibility on the affected side, but there may be pigmentation of the skin and loss of hair and of the teeth (from destruction of the alveolar processes). Enfeeblement of the motor power is slight. The disease is slowly progressive and the prognosis almost hopeless. Clinical experience has been so limited that treatment must be considered experimental.

PART IV.

DISEASES OF THE MUSCLES.

PART IV.

DISEASES OF THE MUSCLES.

MYOSITIS.

Rheumatic myositis, i. e., muscular rheumatism, has already been considered. The true *primary myositis* (acute polymyositis) is a rare affection, not yet understood. It is a disease of youth and middle age, occurs in an acute or subacute form, is probably due to some infectious agent not yet known, and gradually involves all the voluntary muscles of the body. It begins with pains in the extremities and trunk, accompanied with tenderness to pressure, some swelling of the muscles, and some loss of motor power. All these symptoms at first may be very slight. Later, especially when there is fever, the swelling becomes more pronounced, œdematous, and there is a doughy "feel" to the muscles. The swelling is first seen on the extensor side of the extremities, then in the face and trunk. Involvement of the muscles concerned with deglutition and respiration eventually takes place and constitutes a very painful feature of the disease. Enlargement of the spleen is common. Often an exanthem has been observed which is irregularly scattered over the body and limbs and leaves behind it a distinct pigmentation. Bronchitis and lobular pneumonia may occur in the course of the disease, and then the difficulty of expectorating plays a distressing part. In some cases disorders of sensation have been observed, suggesting possible involvement of peripheral nerves; in others diffuse and extensive suppuration of the muscles has been seen. A suppurative form of myositis is also recognized which occurs in connection with pyæmia and some of the infectious diseases, as typhoid fever and influenza.

Death often results within a few weeks, and then usually

from paralysis of respiration. In other cases the course of the disease is slow, and exceptionally life is prolonged for two or three years; in these tedious cases atrophy of the affected muscles is not unusual. Opportunities for the study of myositis are very limited, so much so that even its clinical history cannot as yet be clearly outlined.

The diagnosis is not especially difficult. Myositis closely resembles *trichinosis*, but any doubt can readily be solved by microscopic examination of bits of the muscular tissue. *Multiple neuritis*, which it also resembles in many respects, lacks the œdematous character of the swelling.

The treatment is symptomatic and supporting.

Myositis ossificans progressiva is a form of inflammation of the muscles which usually occurs in men and the essential feature of which lies in progressive calcification or ossification of the affected muscular groups or areas, leaving the structures, after the inflammatory action has subsided, hard and bony. Practically nothing is known of the ætiology of the disease. It runs a tedious course, and so far has not responded to treatment.

PROGRESSIVE MUSCULAR ATROPHY.

A progressive atrophy of the muscular fibres, affecting groups of muscles, depending, not upon any affection of the nervous system, but upon primary changes in the muscles. The disease is also known as Primary Myopathy, Idiopathic Muscular Atrophy, Primary Muscular Dystrophy, and Pseudo-Hypertrophic Muscular Paralysis.

Ætiology.—An inherited constitutional tendency is the only recognized ætiological factor. The disease is usually transmitted through the mother, who herself may not be affected. It may attack very young children, often about the time when they begin to walk, but more frequently just before puberty, more rarely at the twentieth year or later. Boys suffer from it oftener than girls.

Morbid Anatomy.—According to Erb, the primary change is hypertrophy of the muscular fibre. In the so-called pseudo-

hypertrophic form there is great increase of interstitial connective tissue and of the fatty tissue between the muscular fibres, giving to the muscle an appearance of enlargement and a soft, doughy feel. The fibres themselves may be normal or enlarged or atrophied; they are sometimes fissured longitudinally. The enlargement of the muscle as a whole is due almost entirely to an increase of the connective tissue and fat. In the atrophic form of the disease there may be at first some hypertrophy of the muscular fibre, but atrophy is the essential feature. There is a moderate increase of connective tissue, which is rich in nuclei and keeps pace with the atrophy of the muscular fibres. The fibre presents an increase of its nuclei and vacuolation. There are no lesions of the nervous system.

Symptoms.—Various forms of this disease are recognized, but the clinical history of them all is much the same. The onset is gradual. The first thing to attract attention is clumsiness and awkwardness in the movements of the child, with evident insecurity on his legs; an examination reveals enlargement of certain groups of muscles, commonly the calves. Other muscles soon become involved, notably those of the trunk, back, loins and legs. Those usually affected are the extensors of the legs, glutei, lumbar muscles, deltoids, triceps, and the infraspinatus; the muscles of the neck and face, including those of the tongue, pharynx, larynx and eye, almost always escape. The intrinsic muscles of the hands and the sphincters do not become atrophied. As the result of these changes there is remarkable loss of strength in the back, loins and legs, rendering walking difficult and waddling, and causing the child to stumble over the slightest obstacles. He stands with his feet apart, balancing the upper part of his body on the legs; the abdomen protrudes, the shoulders stand backward, and the spinal column in the lumbar region is arched strongly forward. To rise from a chair is laborious and requires the help of the hands, which are placed upon the knee or thigh or upon the arms of the chair. It is still more difficult to get up from the floor. To accomplish this, the child first gets up on hands and feet ("all fours"), then slowly raising the trunk by the use of the arms and gradually elevating the body by placing the hands upon the knees and moving them toward the body, using them as levers, "climbing up his leg." The weakness of the muscles of the shoulder is

great; the shoulder is "loose," the blades project like wings, and when the arms are stretched out they appear of abnormal length; if the child is lifted by placing the hands under its arms, the shoulders are raised up to the level of the ears, and it seems as though the child would "slip through." The affected muscles continuously waste, all the traces of enlargement eventually disappearing; the patient finally becomes bed-ridden, and late in the course of the disease may suffer from contractures and deformities, such as spinal curvature and talipes. Throughout the course of the affection no characteristic sensory disturbances are noted; there is no reaction of degeneration, save in very exceptional instances; the mechanical excitability of the affected muscles is lowered, and the electrical reaction is weakened in proportion to the amount of fatty tissue present and to the degree of atrophy of the muscular fibre. It is claimed by some observers that thyroid enlargement and anomalies of the genitalia are not infrequently seen.

The *atrophic* form differs from the preceding chiefly in the absence of primary pseudo-hypertrophy. Several types have been described, as those of Erb and of Duchenne. The former, known as the *Juvenile form of Erb*, usually declares itself from the eighteenth to the twentieth year of life, exceptionally later, and in many cases first attacks the shoulders and arms, rarely first the back and legs. The symptoms are as described above, with especial prominence of the shoulder-blades. Erb states that the following muscles are almost always affected: the pectoralis major and minor, the trapezius, the latissimus dorsi, the serratus magnus, the rhomboidei, the sacro-lumbalis and longissimus dorsi, and later the triceps. Eventually the muscles of the back and legs are affected, the atrophy attacking chiefly the glutei, the quadriceps, the peronei and the tibialis anticus. The muscles here remaining intact longest are those of the forearm, except the supinator longus, and in the legs the sartorius and the muscles of the calf. Erb also calls attention to possible atrophic changes in the diaphragm, with resultant respiratory disturbances.

In the *Infantile* type of Duchenne there is pronounced and sometimes primary implication of the muscles of the face, preventing perfect closure of the eyes and interfering with speech and pursing of the lips, as in whistling.

The so-called *facies myopathique*, a face void of expression and life, is the result of the wasting of the facial muscles. The affection after a time extends to the muscles of the shoulder and arm ("loose" shoulder) and may proceed further downward. The muscles involved in mastication remain normal. The intrinsic muscles of the hand, as already stated, remain normal in all the muscular dystrophies. As suggested by the name, this type is usually seen among young children; however, exceptionally cases occur in which the first symptoms do not appear until the twentieth year. The course is chronic and the patient, here as in the other dystrophies, may for many years be able to be about; eventually he becomes bed-ridden and suffers from the contractures and deformities which belong to the entire group.

The so-called *Peroneal* type of muscular atrophy (Charcot, Marie, Tooth) is no longer classed with any assurance among the myopathies. It is an affection of childhood, almost exclusively, and begins with wasting of the intrinsic muscles of the foot or of the peronei, extending upward into the thigh. It often results in deformity of the foot (club-foot). The course of the disease is very slow, but eventually it reaches the upper extremities, occasionally producing the claw-hand. It seems to follow certain acute diseases, notably measles, but heredity and family tendency play an important part. It differs from the myopathies in the presence, often, of fibrillary twitchings and of sensory disturbances, and in the order of attack seen in the involvement of the arm, the thenar, hypothenar and interossei being first affected. The reaction of degeneration may be present. It is probable that this affection is of neurotic origin.

Diagnosis.—The *pseudo-hypertrophic* form is easily recognized, chiefly from the contrast, even in the early stage, between the large size of the muscles and their great lack of strength. If the loss of muscular power results from *cerebral* disease, it almost always occurs in the form of a monoplegia, followed by atrophy of the affected muscles. If of *spinal* origin, there are present: fibrillary contractions in atrophied and non-atrophied muscles, reaction of degeneration, frequently marked spastic conditions in the legs, and increase in the reflexes; the disease appears late in life and heredity plays no part.—*Chronic anterior polyo-myelitis* usually begins in

the small muscles of the hand.—The atrophies of *neuritic* origin are characteristic in their distribution, in their marked loss of muscular power as compared with the extent of the wasting, in the absence of any indication of heredity, and in the peculiar gait in case the legs are involved.

The *course* of the muscular dystrophies is very tedious, and the prognosis unfavorable.

Treatment, so far, has done little or nothing to arrest the disease. Erb speaks encouragingly of the use of electricity, but in the main its employment has proved unsatisfactory. Better results have been obtained by massage practiced for a long time and with great gentleness, especially when olive oil is freely used. Moderate and systematic exercise is of service. Much relief, in a negative way, may be afforded by such attention in the late stage of the disease as will prevent the occurrence of contractures in awkward and painful positions. Clarence Bartlett suggests the long-continued internal use of Potassium iodide, from fifteen to thirty grains daily, and of preparations of gold, because of the influence which these drugs exert over fatty degeneration and connective tissue overgrowths. I am not aware that positive results have been obtained under strictly homœopathic medication, but PHOSPHORUS, at least, deserves careful study.

THOMSEN'S DISEASE.

Thomsen's disease, myotonia congenita, is a rather rare disease, especially in America, where only a few cases have been observed; the majority of cases seen have occurred in Scandinavia and Germany. It consists of tonic contractions of the voluntary muscles, chiefly of the arms and legs, rarely of the face, larynx or eye. Nothing is known of its ætiology, save that heredity appears a most prominent factor, almost all the cases so far observed having occurred in family groups.

Symptoms.—The disease comes on in childhood, the first symptoms consisting of awkward stiffness and rebelliousness of the voluntary muscles, nearly always of the arms and legs, particularly noticeable when the first attempt at a voluntary

movement is being made; the stiffness gradually disappears when the effort is continued, but recurs when renewed after a rest. Thus the child, when attempting to walk, can only with considerable difficulty raise and put forward the leg, and the action itself appears ungainly and stiff; the effort continued, the movement becomes easier, and after a time apparently natural; but after resting, the same difficulty is experienced. The arms and hands behave in the same manner, rendering the movements of the child uncertain and giving rise to many accidents and annoyances. There is no pain, and the sensations and reflexes are normal. The muscles themselves are well-nourished, sometimes rather large; in some cases there is considerable muscular force, while others present decided loss of muscular power. A tendency to hypochondria or mental weakness has been observed. Aggravations occur from cold and emotional excitement. Erb's so-called myotonic reaction consists of slowness of muscular contraction and relaxation under electric stimulation and the passing of wave-like contractions from the cathode to the anode. Excision of bits of the affected muscle have shown great enlargement of the voluntary fibres.

The disease is not curable under any known treatment, but gentle and systematic exercise is probably beneficial. It persists throughout life and may eventually become quite general. Temporary arrest of the affection or at least marked temporary improvement is not unusual.

PARAMYOCLONUS MULTIPLEX.

An affection, first described by Friedreich, which consists of clonic contractions, principally of the muscles of the leg, occurring in paroxysms. The nature of the disease and its cause is not understood. It is usually seen in male adults of a nervous temperament, and seems frequently to result from fright or to be closely related to hysterical or choreic conditions. It is possible that the affection is in reality a disease of the nervous system, and Tambroni and Pieracini have placed on record several cases depending upon organic lesion of the nerve centres.

The symptoms consist of clonic spasms which usually begin

in the muscles of the legs, are generally bilateral, frequently number from one hundred to one hundred and fifty in the minute, often distinctly rhythmical. Tremors between the attacks are common. At first the affection does not seriously interfere with the patient's daily occupation, but eventually the muscles of the back and abdomen may become involved, and the patient is rendered helpless from the violence of the contractions.

The *course* is prolonged, recurrences frequently taking place after an interval of years. In a majority of cases the patient finally recovers.

The *treatment* is that of neurasthenia and hysteria. Strong currents of electricity are highly recommended.

PART V.

INTOXICATIONS, HEAT-EXHAUS-
TION, OBESITY.

PART V.

Intoxications, Heat-Exhaustion, Obesity.

ALCOHOLISM.

Acute Alcoholism or Drunkenness.—The symptoms of acute alcoholism are familiar to all and need not be described here. It is, however, well to point out their close similarity to apoplexy, and the necessity of caution in differentiating between these two conditions, for mistakes are by no means infrequent. In apoplexy the unconsciousness of the patient is much more profound; breathing is stertorous; there may be hemiplegia, and there is an absence of alcoholic odor about the breath.

Chronic alcoholism results from the long-continued and immoderate use of alcoholic stimulants and their effects upon the system at large, especially upon the digestive and the nervous system. That the poisonous action of alcohol is far-reaching and diversified, is evident from the fact that it is closely connected with the ætiology of very many diseases discussed in the body of this book. It is probable that the general tissue changes produced under its influences are due to (1) the action of the poison upon the blood, which it impoverishes and whose power of oxygenation it lessens materially, (2) its direct action as an irritant upon the tissues with which it is brought into contact, and (3) its effects upon the nervous system, causing motor paralysis and impairing reflex action.

The *digestive* system usually suffers first. A gastric catarrh develops, more or less intense, with derangement of appetite, dryness of the mouth, lips and tongue, furred tongue, and a tendency to constipation. A marked symptom is the faintness and sense of gastric emptiness and goneness at the stomach

from which chronic alcoholics suffer so much, especially in the morning, and which by its prompt disappearance under a renewed dose of the stimulant becomes a potent agent in hopelessly fixing the habit. In the *nervous* system a group of symptoms appears which in many respects suggests neurasthenia. The time of their appearance varies and depends largely upon the presence or absence of a neurotic tendency in the individual. A certain, and often very marked, unsteadiness of the muscles is usually the first indication of beginning trouble, followed by tremors which are especially noticed in the hands and tongue, less pronounced in the legs. The mental faculties become weakened, and the patient himself is quite conscious that he needs the stimulation of a drink to steady himself and become fit for the common duties of the day. He is slow to think, undecided in action, irritable and peevish, loses his ideality, cannot reason correctly, and gradually descends to a lower plane of life and action than that formerly occupied by him. Of this fact he is for a long time conscious, and suffers keenly from the knowledge, but unless possessed of a powerful will he drifts with the current, and eventually reconciles himself to the seemingly inevitable. His sleep in the meantime has grown unrefreshing, often full of unpleasant dreams and frequently disturbed by muscular twitchings; in the morning he awakens tired, out of sorts, despondent, "gone" and faint at the stomach, and with intense craving for the renewed stimulation. In the meantime the peripheral nervous system has broken down, a multiple neuritis occurring in a large number of cases, extending from the periphery to the centre, with disturbances of sensation which may consist of painful hyperæsthesia, a diminution of sensation, or morbid sensations (as though ants were crawling over his body). Epileptiform convulsions have also been noted. Perhaps the most striking symptom of this process of degeneration is the constantly decreasing stability of mind, the loss, eventually, of all appreciation of propriety, honor, and a progressive and very notable impairment of will-force.

The outcome of it, in many cases, is *alcoholic insanity*. This is frequently foreshadowed by increasing and fixed despondency, with a suspicious attitude toward all who are about and associated with the patient. This suspiciousness finally becomes

the basis of hallucinations of both sight and hearing, with delusions of persecution. The mental condition now is one of great despondency and constant fear, and may lead to the commission of crime as a means of escape from torture or an act of self-defence. Exceptionally, notions of aggrandizement and exaltation, with religious hallucinations, prevail. Spitzka states that delusions of alcoholic insanity almost always relate to the sexual organs, to the sexual relation, or to poisoning, and this is substantiated by many alienists. In some cases alcoholic insanity is sudden in its onset, assuming the initial form of an attack of delirium tremens, without recovery from the paroxysm. In some instances a victim of alcoholic mania, when not under the influence of alcohol, may be peaceable and to all intents and purposes fully responsible for his actions, but become a raving madman as soon as he has taken a drink. The organic changes in the nervous system are those of a low grade of inflammation and resemble those arising from old age and wasting diseases.

Cirrhosis of the liver is a conspicuous feature of chronic alcoholism. It is now held that a natural tendency to this condition is an important factor, and that in the absence of it many confirmed drunkards develop no symptoms of it. The *kidneys*, according to hospital statistics, are usually somewhat enlarged. The enlargement of the venules of the face, particularly of the nose, the coarseness of the face, the watery eyes, and the "pimples" of the drunkard—acne rosacea—are among the common and familiar minor results of chronic drunkenness.

Delirium Tremens or *Mania a Potu* is to all intents and purposes an acute attack of alcoholic mania which occurs in connection with chronic alcoholism. Persons of temperate habits are not liable to such an attack, even though they may have indulged in a severe and protracted debauch; it is the habitual drunkard who furnishes the victim. It is stated upon good authority, and the statement is accepted by many, that the sudden withdrawal of alcohol in an alcoholic may give rise to delirium tremens; but such attacks, so far as my experience goes, more truly resemble a prolonged period of intense, hysterical nervous excitement, with only moderately pronounced characteristics of alcoholic poisoning.

In nearly all cases restlessness, uneasiness, despondency, ap-

prehensions of trouble, and insomnia are prodromal symptoms, continuing for a period of two or three days before the delirium declares itself. The restlessness increasing, the patient gradually loses control of himself, becomes incoherently talkative, and insists upon getting to his business or expresses a determination to attend to some imaginary, urgent affair which requires his presence. Muscular tremors are frequent, especially of the hands; they are much aggravated from attempted voluntary movements. The delirium itself is characterized by fearfulness; even before the delirium has declared itself the patient often suffers from apprehension of danger, and frequently, in spite of a guarded exterior and of great efforts to hide his mental condition, his actions betray him. In the delirium hallucinations of sight and hearing, especially the former, torment him. He sees disgusting and horrible objects all about him; mice, rats and snakes run or crawl about his room, bed, or person, and threats and insults proceed from the voices of invisible persons. This results in paroxysms of uncontrollable rage and fear during which the patient endeavors to make his escape through doors or windows, and will not hesitate, even though naturally of a peaceful or timid disposition, to attack his attendants, whom he fancies in league with his persecutors. The delirium is at first worse during the night and lighter during the day, but soon it becomes constant. Accompanying symptoms are: rapid, weak, compressible pulse; elevation of temperature, ranging from 101° to 103° , and higher when there are complications or the case is unusually severe; complete loss of appetite; copious sweating; scanty, albuminous urine.

In light cases the patient after a few days falls into a prolonged sleep, to awaken refreshed and on the road to rapid recovery. In others, sleep returns gradually, the hallucinations become less persistent, the moral tone improves, there is some relish for food, and gradually a normal state is regained. On the other hand, delirium may continue indefinitely and terminate in alcoholic insanity; or the nervous symptoms increase in intensity, sleeplessness persists, and the condition soon resembles the typhoid state, with extreme prostration, exceedingly rapid and weak pulse, dry cracked tongue, with evident tendency toward a fatal termination, death occurring from heart failure.

The action of alcohol upon the kidneys and liver is at times very severe and renders the prognosis more serious than it otherwise would be. Pneumonia also is not uncommon, and must be looked for in cases of known exposure to cold; since the signs here may not be well marked, repeated examinations of the chest must be made.

Recovery is the rule in the first attack, but the prognosis must be more guarded with each recurrence and in the presence of the complications described, especially pneumonia.

The diagnosis of delirium tremens is rarely difficult. It depends chiefly upon the history of the case, the character of the delirium, in which fear strongly predominates, and the presence of tremors. It is necessary to watch for complications and to guard against overlooking the existence of some injury, since it is a well-established fact that even a trifling hurt may in a chronic alcoholic precipitate an attack of delirium tremens. In case of pneumonia involving the apex of the lungs, the delirium often bears a striking resemblance to that of mania a potu, but the delirium of pneumonia is more aggressive and has no tremors.

Treatment.—*Acute alcoholism* requires little attention. Nearly always a profound sleep prevails from which the patient awakens refreshed and “quite himself.” In exceptionally violent cases the hypodermic injection of one-eighth to one-sixth of a grain of apomorphia is very useful; it causes free emesis, lessens the delirium, and does much toward sobering the victim. Thorough washing-out of the stomach is advisable when the nervous system suffers severely. Occasionally there is marked collapse, in which case brisk rubbing of the body and hot applications are useful. In the rare cases characterized by convulsions, chloroform may be used, but with caution. Having recovered from the immediate effects of a debauch, pains must be taken to protect the victim from an early repetition of it. An abundance of nourishing liquid food should be given, and quiet and rest be insured. The Turkish bath is a valuable auxiliary at this time and assists in getting rid of the last traces of alcohol in the system.

Chronic alcoholism first of all demands absolute withdrawal of the poison. This can best be accomplished by placing the patient in some institution where he is not only beyond actual

temptation or power to indulge himself, but can be managed with judicious firmness, should necessity arise. Sleeplessness and nervous tension are sure to prove stubborn and must be overcome, the former by the prudent use of bromides or hyoscyne hydrobromate, the latter by enforced quiet and nourishing diet, chiefly milk. It is useless to deny the absolute necessity of occasionally using hypnotics, and sometimes in large doses; but it is a very serious blunder to resort to them upon slight temptation. During this time of great trial it is well to allow the patient an occasional cup of good, strong coffee and to season his food generously. For the latter purpose red pepper is invaluable. It supplies to the enervated gastric mucous membrane a substitute for the alcohol to which it is accustomed, increases the relish for food, and is altogether grateful to the patient. Occasional doses of from twenty to thirty drops of the tincture of capsicum will give tone to the stomach and lessen the craving for drink.

The exhibition of ARSENICUM, HYDRASTIS, NUX, STRYCHNIA, is very often demanded by the symptoms present. Their relation to the digestive organs, especially the stomach, and to the nervous system is well understood, and symptomatic indications need not be given here. HYDRASTIS has proved very serviceable in my hands, especially in the relief of the gastric catarrh of chronic alcoholism, with "faintness" at the stomach and intense craving for stimulants. ARSENIC has done best in triturations ranging from the third decimal to the twelfth, while HYDRASTIS and NUX should be given in almost physiological doses.

Delirium Tremens.—The patient must be kept in bed, in a quiet room, protected against intrusion, guarded against excitement of any form and possible escape. To accomplish the latter, the doors and windows must be securely fastened, especially if the sick-room is up-stairs, and constant watch upon the patient must be kept both day and night. It is not well to strap him to the bed if it can be avoided, as may often be done by an attendant of experience in the management of such cases, but if force must be employed to restrain the patient, it is far better to use a strong sheet thrown over him and fastened at the sides, or even a strait-jacket, or soft, leather hand-cuffs, than to allow a series of hard struggles between him and the

nurses. Alcohol should be withdrawn at once, unless there is danger of heart failure. One of the most important objects of treatment is to insure sleep, and to that end hyoscine hydrobromate, not to exceed $\frac{1}{100}$ part of a grain, may be given. Chloral (15 to 20 grains) is in favor with many practitioners of experience; it is unsafe if the action of the heart is feeble. The wisdom of giving opium here is doubtful; if used at all, it must be administered in the form of hypodermic injections of morphia, and its effects are to be carefully noted. The free use of the warm pack may prove of great advantage in quieting the patient and inducing sleep. If there is much fever, the cold pack may be employed, aided by the exhibition of ACONITE, BELLADONNA, GELSEMIUM, or any other remedy which is indicated. Hot fomentations to the loins and hot sitz-baths are of value when there is suppression of urine. Should heart-failure threaten, alcohol with spirits of ammonia is preferable to digitalis, which, as demonstrated by experience, must here be given in very large doses to accomplish its purpose.

Especial attention must be paid to the diet. It is of the utmost importance that the patient's strength be sustained, and to this end milk or concentrated meat broths, with egg-albumen, are to be given every three hours. Here also it is well to season very highly with red pepper. Predigested foods may be used to advantage; feeding per rectum may be demanded.

The remedies most likely to prove of value are BELLADONNA (sleeplessness especially prominent), HYOSCYAMUS (convulsive action pronounced), and occasionally STRAMONIUM (incessant talking). AGARICUS, CANNABIS INDICA, CIMICIFUGA, GELSEMIUM and OPIUM are frequently useful.

LEAD-POISONING—PLUMBISM—SATURNISM.

Lead-poisoning is common throughout the civilized world. It results from the introduction of lead into the system, usually in the pursuit of an occupation (painters, printers, workers in white-lead factories, plumbers, glaziers, etc.) which involves handling of lead and exposure to its action. In persons who are not thus employed poisoning may be due to the use of

drinking-water stored in cisterns lined with lead or conducted through lead pipes, or of sour wines or acidulated drinks (especially when sold in siphons provided with lead tips) which have come in contact with lead; less often, and yet not infrequently, specific toxic effects are caused by lead contained in hair-dyes, false teeth set on cheap plates, and other articles containing lead which are in daily use. Lead enters the system through the digestive organs, lungs, and skin; it is eliminated by the kidneys and skin. Persons between 30 and 40 years of age furnish the larger percentage of victims, but no age is exempt. Women are more susceptible to it than men. Individual susceptibility is an important item; in some cases violent symptoms occur from slight exposure, while others suffer very little from constant handling of dangerous articles.

Acute lead-poisoning finds its typical expression in the so-called *lead-colic* (*colica pictonum*), which is commonly seen in workmen employed in handling lead or its compounds. The attacks are frequently preceded by malaise. Colic develops rather suddenly, accompanied with loss of appetite, whitish and contracted tongue, sickness at the stomach, severe retching and vomiting, intense thirst and stubborn constipation. The colic is constant and the pain dull and heavy, with recurring paroxysms of severe aggravation, with sharp and twisting pain, preferably near the umbilicus. A characteristic feature is the hard, rigid, knotted, retracted condition of the abdomen. The pain is usually relieved from hard pressure. During the severe paroxysms the pulse increases in tension and the action of the heart is somewhat retarded. The pupils frequently are unequal. Often the patient complains of neuralgic pains in the chest and extremities, and there may be jaundiced coloring of the conjunctiva. In another type of cases, also seen among workers in lead, the symptoms are more intense and the nervous system suffers more severely. There is in some rapidly developing anæmia. A true, often rapidly fatal, gastro-enteritis prevails in others. Or the case assumes the form of an acute neuritis, with convulsions, possibly of an epileptiform character, and marked delirium. Mackenzie states that acute lead-poisoning is more frequent in winter than in summer.

Chronic lead-poisoning constitutes an exceedingly complex

and varied group of conditions. *Anæmia* is one of its common and, usually, earliest features. It is rarely profound, the corpuscles not often sinking below fifty per cent. The characteristic *blue line* along the *gums* is typical. It consist of a blue-black line at the margins of the gums, which results from the absorption of lead into the tissues and its conversion into a black sulphide. It may form quickly, disappearing after a few weeks, or it may remain for a considerable length of time. The gum itself is irregular in outline, receded from the teeth and ulcerated. This line must be distinguished from a line *on* the gums, also common, which may be easily wiped off or removed by brushing. *Lead-colic* is frequent and does not differ from the attacks already described.

Of particular interest are the direct effects of lead-poisoning upon the *nervous system*, there giving rise to palsy affecting different groups of muscles (localized palsy) or general paralysis. Of the former, the so-called *wrist-drop* is the most characteristic and clinically the most important form. It affects both wrists, first the wrist of the arm most used, and is due to paralysis of the extensor muscles of the hand. It is followed by atrophy of the affected muscles, with eventually great diminution and even complete loss of electro-contractibility. The following localized forms are recognized by Madame Déjérine-Klumpe: The *ante-brachial* type, involving the extensors of the wrist and fingers, causing wrist-drop, atrophy, sometimes swelling over the wrist from displacement backward of the bones of the wrist-joint and distension of the synovial sheaths. The *brachial* type, which usually is secondary to the ante-brachial type, but may be primary. It involves the deltoid, biceps, brachialis anticus, supinator longus, sometimes the pectorals. The paralyzed muscles atrophy. The *Aran-Duchenne* type, sometimes primary, often seen in tailors (Moebius), involving the small muscles of the hand and of the thenar and hypothenar eminences. Marked atrophy, according to Gowers, occurs simultaneous with the palsy. *Peroneal* type, involving the lateral peroneal muscles, the extensor communis of the toes, and the extensor proprius of the big toe, causing the so-called "steppage gait." The *laryngeal* form, resulting in adductor paralysis.

Generalized palsies, usually beginning with wrist-drop, grad-

usually involve all the extremities, their course being essentially chronic; in other cases all the muscles of an affected part become involved with great rapidity. Exceptional forms have been described, as the case reported by Oliver in which complete paralysis of a large area of muscles took place within a very short time, even a day. Others bear close similarity to sub-acute spinal paralysis; and in still others there has been involvement of muscles which are rarely affected, as the diaphragm. In all these types of paralysis the onset of the affection may be, and usually is, marked by sharp neuralgic pains in the legs and joints (saturnine arthralgia); there are, later on, twitchings of muscles, sometimes cramps (calves), tremors, wasting of affected muscles, following the palsy or developing with it, frequently reaction of degeneration, and usually loss of response to electric stimulation. Sensation may be normal.

The *brain*-symptoms are varied. In addition to the hysterical and neurasthenic conditions which are found with especial frequency in girls, there are tremors, sensory and motor disturbances of cerebral origin, insomnia, convulsions which may be epileptiform or alternated with or followed by trance, epilepsy, delirium with hallucinations, coma, and, exceptionally, insanity, usually melancholia. Cases have been reported which bear a close resemblance to the general paralysis of the insane. Optic neuritis, neuro-retinitis, atrophy of the optic nerve, palsy of the ocular nerves and laryngeal palsy may also be the result of lead-poisoning.

In addition, arterio-sclerosis with contracted kidney and cardiac hypertrophy is relatively frequent among lead-workers. Gouty deposits, especially in the big toe, are common in England, much less so in America. In women, menstrual derangements and ovarian or uterine disease frequently results from lead-poisoning, with a strong tendency to abort in case of existing pregnancy.

The *prognosis* is nearly always favorable, provided the subject can be protected against further exposure. Wrist-drop is often permanent. Extensive atrophy of palsied muscles renders recovery improbable. Violent convulsions are unfavorable.

The *diagnosis* is not difficult, for there is usually a history of exposure, with such characteristic symptoms as the presence of

the blue line on the gums or lead colic or palsy. If, as sometimes happens, a diagnosis cannot readily be made, the presence of lead in the urine must be established by tests, for which consult special works; they are delicate and had better be left to an experienced chemist. Iodide of potassium stimulates the elimination of lead by the kidneys; it is, therefore, well to place the patient under its influence before testing the urine.

Treatment.—Perfect cleanliness of the hands and finger nails, frequent bathing and the use of respirators constitute the most important prophylactic measures within easy reach of persons obliged to work in lead or its compounds. An attack of lead-poisoning having been experienced, the prevention of further exposure is, of course, the most essential condition to a cure. Elimination of the poison by the kidneys is all-important and can be insured by the exhibition of iodide of potassium, in doses of five to ten grains, three times daily. The bowels, in the meantime, should be kept open, and to this end salts or appropriate mineral water may be used. Massage, systematically employed, also has a high reputation for aiding in the elimination of lead. Lead-colic requires hot applications and opium. The hypodermic use of morphia is a common practice, though open to the restrictions which apply to this method of relieving pain. Lilienthal advised the rapidly alternated use of a towel wrung out of ice-cold water over the entire surface of the abdomen, to be retained for a few seconds, and of a nearly burning dry napkin.

The following remedies are indicated: OPIUM, NUX VOMICA, ARSENICUM, BELLADONNA, ALUMINA. The constipation of lead-poisoning is best met by OPIUM or NUX VOMICA, aided by a strong interrupted current through the abdomen, used daily in brief séances. The palsies require massage and the persevering use of the constant electric current.

MORPHINISM.—MORPHIOMANIA.

The victims of the morphine habit are almost invariably persons, usually women or medical men, who are great sufferers from some painful disease, such as sciatica; the relief from pain obtained by taking the drug establishes the habit. The doses are gradually increased, not as a matter of choice, but of neces-

sity, and no harm seems to follow; after a time, varying greatly in different persons, the patient is unable to get along without the drug, experiencing an uncontrollable desire for it and a sense of keen discomfort and nervousness when not under its influence, all promptly relieved when the craving for morphine is satisfied. This condition marks the beginning of morphinism.

The symptoms which now develop vary in different persons, but their totality always constitutes a state of great physical and mental wretchedness. There is extreme lassitude and depression of body and mind. The appetite is lost, and nausea, epigastric uneasiness and faintness, sometimes acute pain, are persistent, but are promptly relieved when morphine is taken. A settled restlessness takes hold of the patient; he cannot content himself anywhere, keeps constantly on the move, grows morose and irritable, and can no longer find refreshing sleep. The pupils often are unevenly dilated when not under the influence of the drug; there is in many cases uncontrollable itching of the skin, and occasionally spells of profuse sweating, preceded by chilling, which bear some resemblance to malarial fever; elevation of the temperature, as high as 104° , has been noted in this connection. The nervous symptoms resemble those of hysteria and neurasthenia. The mental condition is characteristic. The patient is suspicious of everybody and thinks himself the object of all kinds of persecution; moreover, he is sure to become an inveterate liar upon whom no dependence whatever can be placed. The utter instability of the morphine fiend is remarkable. In some cases the mind dwells much upon sexual matters, and suspicion of unfaithfulness on part of a companion is quite a common occurrence. The appearance of the patient is drawn, haggard, thin, sallow and prematurely aged. A profound asthenia finally prevails, the subject becomes wholly unmanageable, refuses to take nourishment, and dies from exhaustion.

The prognosis is serious, because the greater number of patients, even after the habit has been broken, relapse sooner or later. In those of strongly marked neurotic tendency and in persons who continue to suffer from severe pain, due to an incurable disease, the outlook is exceedingly discouraging. These facts should be sufficient to make medical men hesitate before they allow their advice to pave the way for the establish-

ment of this frightful drug-disease, especially when they consider that according to statistics morphinism appears to be on the increase and that the medical profession from its own numbers furnishes many victims.

Treatment.—The nature of the affection is such that a great deal more can be accomplished in an institution, such as a State hospital, than at home. The chief indications are: rapid withdrawal of the drug and supporting treatment. To accomplish this, the patient must be put to bed for at least ten or twelve days, isolated from all save the necessary attendants, and surrounded by nurses who can neither be coaxed nor bribed into supplying the patient with morphine. Whether, or not, it is best to withdraw the morphia at once, or rapidly, or gradually, is still, to a certain extent, an open question. Since the former plan involves a severe shock, while the very gradual withdrawal seems like the useless prolonging of a battle which should be fought in the shortest length of time possible, the middle ground seems the safest and best; experience confirms the wisdom of rapid lessening of the accustomed dose and complete withdrawal in from ten to fourteen days. To sustain the patient, careful attention must be paid to feeding, and milk or meat-broths, with egg-albumen, should be given in suitable amounts once in three hours, or even oftener. The excessive restlessness is best combated with hot baths. The sleeplessness, if other means fail, may demand the exhibition of such hypnotics as sulphonal or hyoscin; in extreme cases even morphia may have to be given; the objections to the latter course are evident. If there is danger of heart failure, stimulants are demanded, as alcohol, aromatic spirits of ammonia or digitalis. Much comfort can be afforded if the attendants have sufficient devotion to duty and the necessary tact to keep the patient's mind busy, drawing his attention from himself to extraneous matters.

The specific value of remedies here has not yet been determined. *NUX VOMICA*, *IGNATIA*, *ERYTHROXYLON COCA* and *CHINA* suggest themselves as probably useful; it is stated that *CHINA* is valuable in the diarrhœa which often prevails in these cases.

The plan, which is occasionally advocated, of first substituting cocaine for morphia, and then breaking the cocaine habit, does not commend itself to sound judgment.

COCAINISM.

The cocaine habit is comparatively infrequent, and, when found, usually has been acquired with the view of substituting it for the morphine habit. Sometimes both exist in the same person.

The symptoms are those of a general breaking-down of body and mind. The digestion soon becomes seriously deranged, with failure of general health, great emaciation, loss of strength, and pasty, yellowish, bronze skin. The pulse is rapid, weak, sometimes irregular, and there may be troublesome shortness of breath. The nervous symptoms are restlessness, sleeplessness, instability of purpose, neglect of person, talkativeness, untidiness, untruthfulness. Hallucinations and delusions develop, among which tactile hallucinations, on account of their comparative infrequency, are particularly noteworthy; the patient has a sensation as though something were beneath the skin, especially about the tips of the fingers, and he will pass hours in attempting to remove it. Hyperæsthesia to touch is also marked. It is said that a tendency to malice and ugliness is common. Unless relieved, the case terminates in insanity with homicidal mania.

The treatment consists of prompt withdrawal of the drug; competent observers consider this perfectly safe. The patient should be confined in a properly equipped institution where he can be kept under close observation for a considerable period of time. Supporting measures must be adopted and especial indications met as they arise. The general line of treatment is much like that of morphinism.

ARSENICAL POISONING.

Acute arsenical poisoning causes violent gastro-enteritis, often with collapse, and if not fatal, is frequently followed by serious nervous affections culminating in paralysis. Treatment consists of removal of the poison by emetics and stomach pump, the administration of milk and egg and, if the arsenic was taken in solution, the use of large doses of dialyzed iron (from six to eight drachms).

Chronic arsenical poisoning, as here discussed, results from

long-continued exposure to the action of arsenic contained in articles of ornamentation and daily use about the house and person, in the manufacture of which compounds of arsenic are employed an account of their special merit as brilliant dyes, especially reds and greens. To these articles belong fancy tissue-papers, artificial flowers, wall-papers and fabrics which are used in making carpets, hangings and occasionally wearing-apparel. The particular manner in which the poison enters the system has been made the subject of careful study. It is thought that the arsenic is inhaled in small particles which have become detached or in a gaseous volatile form, the latter due to the action of a number of moulds, favored by moisture and a temperature of from 60° to 95°. The gaseous product is an organic derivative of arsenic pentoxide. The question is not yet settled, and some go so far as to deny the possibility of arsenical poisoning from the sources indicated.

Symptoms.—The symptoms caused by the accumulation of very minute doses of arsenic in the system are exceedingly uncertain. There is loss of appetite, nausea, irritation of the mucous membrane of the eyes, nostrils, mouth, throat, stomach and intestine, dryness of the eyes and nostrils, general weakness, emaciation, restlessness and a state of feverish irritability of the nervous system, with anæmia, sleeplessness, dizziness, mental depression, fitfulness of disposition, constrictive headache, numbness and pricking of the extremities. Very exceptionally even more serious disturbances, such as convulsions and paralysis, may occur.

Kirchgæsser places particular value upon the appearance of a brown pigmentation of the skin of the face, inflammatory affections of the eyelids, disturbances of sensibility and of motion, especially in the lower extremities, with scalding during urination.

The diagnosis usually is difficult, in many cases almost impossible. It is quite probable that only some minor symptoms are present which attract attention chiefly by their persistency and by the difficulty of accounting for them. In such cases it is well to examine into the surroundings of the patient for possible causes of chronic poisoning by arsenic; if possible cause is found, careful examination of the urine must be made to substantiate or disprove the suspicion.

The treatment consists of meeting symptomatic indications as they arise. The patient is almost sure to recover if the cause of the mischief is found and removed.

PTOMAININE POISONING.

Ptomaines and toxines are alkaloids formed in the process of decomposition of animal matters, the term "toxines" being applied by Brieger to those possessing distinctly poisonous properties. This article is restricted to ptomaines taken with the food.

Meat-poisoning occurs usually from eating sausage, ham, head-cheese, meat (pork) pie; less often from eating beef, veal or mutton.

Sausage-poisoning (*botulism* or *allantiasis*) is quite common in Germany, where the use of meat in this form is extensive. Canned meats are not free from danger, and cases of fatal poisoning with it are on record, as quite recently the case of Mr. Anton Seidel, the distinguished musical leader.

The symptoms of meat-poisoning are those of acute gastrointestinal irritation; in the case of poisoning by canned meat the toxic effects may be due to the formation of muriate of zinc and muriate of tin.

The following description of the Welbeck cases, furnished by Ballard, and quoted by Vaughn, Osler, and other writers on this subject, is complete and typical:

"A period of incubation preceded the illness. In fifty-one cases where this could be accurately determined, it was twelve hours or less in five cases; between twelve and thirty-six hours in thirty-four cases; between thirty-six and forty-eight hours in eight cases; and later than this in only four cases. In many cases the first definite symptoms occurred suddenly, and evidently unexpectedly, but in some cases there were observed during the incubation more or less feeling of languor and ill-health, loss of appetite, nausea, or fugitive, griping pains in the belly. In about a third of the cases the first definite symptom was a sense of chilliness, usually with rigors or trembling, in one case accompanied by dyspnoea; in a few cases it was giddiness with faintness, sometimes accompanied by a cold sweat and tottering; in others the first symptom was headache or

pain somewhere in the trunk of the body, e. g., in the chest, back, between the shoulders, or in the abdomen, to which part the pain, wherever it might have commenced, subsequently extended. In one case the first symptom noticed was a difficulty in swallowing. In two cases it was intense thirst. But however the attack may have commenced, it was usually not long before pain in the abdomen, diarrhœa and vomiting came on, diarrhœa being of more certain occurrence than vomiting. The pain in several cases commenced in the chest or shoulders, and extended first to the upper and then to the lower part of the abdomen. It was usually very severe indeed, quickly producing prostration or faintness, with cold sweats. It was variously described as crampy, burning, tearing, etc. The diarrhœal discharges were in some cases quite unrestrainable, and (where a description of them could be obtained) were said to have been exceedingly offensive and usually of a dark color. Muscular weakness was an early and very remarkable symptom in nearly all cases, and in many it was so great that the patient could only stand by holding on to something. Headache, sometimes severe, was a common and early symptom; and in most cases there was thirst, often intense and most distressing. The tongue, when observed, was described as usually thickly coated with a brown, velvety fur, but red at the tip and edges. In the early stage the skin was often cold to the touch, but afterward fever set in, the temperature rising in some cases to 101°, 103° and 104° F. In a few severe cases, where the skin was actually cold, the patient complained of heat, insisted on throwing off the bed clothing, and was very restless. The pulse in the height of the illness became quick, counting in some cases 100 to 128. The above were the symptoms most frequently noted. Other symptoms occurred, however, some in a few cases, and some only in solitary cases. These I now proceed to enumerate. Excessive sweating, cramps in the legs, or in both legs and arms, convulsive flexion of the hands or fingers, muscular twitchings of the face, shoulders or hands, aching pain in the shoulders, joints or extremities, a sense of stiffness in the joints, prickling or tingling or numbness of the hands, lasting far into convalescence in some cases, a sense of general compression of the skin, drowsiness, hallucinations, imperfection of vision, and intolerance of light. In three cases (one

that of a medical man) there was observed yellowness of the skin, either general or confined to the face and eyes. In one case, at a late stage of the disease, there was some pulmonary congestion and an attack of what was regarded as gout. In the fatal cases death was preceded by collapse like that of cholera, coldness of the surface, pinched features, and blueness of the fingers and toes and around the sunken eyes. The debility of convalescence was in nearly all cases protracted to several weeks.

"The mildest cases were characterized usually by little remarkable beyond the following symptoms, viz., abdominal pains, vomiting, diarrhœa, thirst, headache, and muscular weakness, any one or two of which might be absent."

Poisoning by milk-products, especially cheese and ice-cream, is not uncommon. The symptoms here also are those of violent gastro-intestinal irritation. They are caused, according to Vaughn, of Michigan, by a substance which he separated from poisonous cheese and which he called "tyrotoxin."

Poisoning by shell-fish and fish (Ichtyismus) is frequent. It is characterized by the same intense action of a toxine upon the gastro-intestinal tract which belongs to the other groups. Poisoning by mussels, eaten raw or cooked, is the most striking form, and was carefully studied in connection with a series of cases which occurred at Wilhelmshaven. It seems probable that the mischief arises from the food taken by the mussels or from the operation of local conditions; at least the mussels transplanted from Wilhelmshaven to other points soon ceased to be poisonous, and those introduced from other localities, and heretofore perfectly harmless, soon became noxious. The same facts, i. e., the effect of food and of local conditions, may be of importance in connection with fish. Breiger separated a substance, found chiefly in the liver of the mussel, which he called *mytilotoxin*. The choleraic symptoms from eating poisonous mussels are peculiar in that they are accompanied with rapid collapse and in some cases death within two or three hours. Oysters and various kinds of fish, among them the Russian sturgeon, salted, often give rise to serious illness.

Treatment.—In all cases of ptomaine-poisoning the noxious substance must be promptly removed from the stomach. Strong black coffee may be administered freely, and other stim-

ulants may be given, with hot applications to the stomach and bowels, and mustard drafts to the feet.

ARSENICUM is of all remedies the most reliable; VERATRUM ALBUM, CAMPHOR and NUX VOMICA may also be serviceable. BRYONIA was recommended by Hering.

HEAT-EXHAUSTION.

Heat-exhaustion is the result of prolonged exposure to a high temperature, especially when combined with severe physical exertion. The person is "overcome" by the heat. Exposure to the sun is not necessary; many cases occur from long-continued confinement in a close room during mid-summer, in the pursuit of certain employments, as that of stokers on large ocean steamers. The mildest form is the great weakness from which persons not naturally very strong often suffer during the heated term, especially during the hot close nights of mid-summer. If severe, this weakness borders upon fainting, with pallor and coldness of the surface, sensation of threatening heart failure, cold perspiration and great exhaustion. In fully developed cases the bodily surface is icy-cold and the pulse rapid and feeble; there is restlessness and, possibly, muttering delirium, unconsciousness, a rapid fall of temperature to 96° or 95°, and collapse.

Diagnosis.—The remarkable fall of temperature distinguishes heat exhaustion from thermic fever, which is characterized by an equally pronounced *rise* of the bodily temperature. The condition is not always at once distinguished from the collapse of heart disease or internal bleeding; however, the history of the case and the very markedly subnormal temperature of heat exhaustion are usually sufficient to establish the diagnosis.

Treatment.—While heat-exhaustion is not a condition of especial danger, measures for relief should be employed energetically. The patient should without delay be placed into the hot bath and heat be applied in every form. Brisk rubbing is excellent. Strychnia and digitalis, hypodermically, will stimulate the heart and the vaso-motor system. Ammonia and

alcoholic stimulants may be given as demanded by the patient's condition. After recovery from the attack, perfect rest should be maintained for a considerable period of time.

Thermic Fever, Sun-Stroke.—Thermic fever is an acute fever produced by exposure to natural or artificial heat, chiefly by exposure to the intense heat of the sun while undergoing severe physical exertion. Soldiers on the march, heavily encumbered, and laborers in the field or on the street furnish many victims. Moist heat is much more dangerous than dry heat, hence the great frequency of sun-stroke in tropical countries, particularly in low, swampy lands and among persons at work in a hot, damp atmosphere. It is not unusual, especially in southern and moist countries, to have cases of thermic fever occur in the night. Men are more liable to the affection than women, on account of greater exposure; persons already exhausted by fatigue, or weakened by intemperance, beyond doubt furnish a large percentage of the victims. Those visiting tropical countries and not yet acclimated are in particular danger, while the natives may suffer no inconvenience.

Morbid Anatomy.—H. C. Wood, the highest American authority on sun-stroke, has shown that many of the most striking *post mortem* changes are due to the intense heat of the body, modified more or less by the treatment had and the time of death. "If the patient has died during an acute sun-stroke, with high temperature, and the autopsy be made at once, the left heart will be found contracted, the right heart usually engorged, the semi-fluid blood collected in the venous trunks, and the arterial coats, or it may be the whole body, marked with petechiæ or stained with decomposing blood. In some cases the blood has an acid reaction. Many years ago I proved that the cause of the symptoms and the structural lesions in thermic fever is simply excessive heat. The history of the development of an attack is probably at first a slow rise of the bodily temperature, produced by the inability of the system to get rid of the heat which is formed in it; after a time the inhibitory heat centers at the base of the brain, which control the formation of bodily heat, become exhausted by effort or by the fever itself; and as a consequence of the removal of inhibition there is a sudden increase of the formation of heat, with a corresponding up-bound of the bodily temperature and consequent uncon-

sciousness from the paralyzing influence of the heat upon the cerebral cortex. All the higher tissues of the body are affected directly by the excessive temperature, and death from a pure heat paralysis of the respiratory centers may quickly occur."

"Myosin (the substance whose coagulation produces post mortem rigidity) coagulates about the maximum temperature of sun-stroke. After severe exertion the muscles, including the heart, contain an excess of a myosin which is more prone to undergo coagulation than is normal myosin. In this fact is found the explanation of the extraordinary positions of the corpses of those who have been killed in battle; instantaneous death has been followed by an equally instantaneous coagulation of the myosin of the general muscles, so that the body has been frozen in the attitude at which life was stopped. The heart is in the center of bodily heat; not rarely in tropical battles, especially when troops have been charging up-hill, the overstrained heart has been suddenly arrested by the coagulation of its myosin, and the man has fallen on his face in instantaneous syncopal death."

Symptoms.—In a typical and severe case the onset almost always is sudden, the patient dropping unconscious, as though knocked senseless. If there are prodroma, they consist of severe pain in the head, with dizziness, often visual disturbances, feeling of great heat and oppression, and sickness at the stomach, possibly vomiting. Unconsciousness may be more or less profound; there is usually restlessness, twitching, jerking, sometimes convulsions, which may be epileptiform; in other cases there is deep coma and complete muscular relaxation; but usually the coma develops gradually, it being the rule that at first it is possible to partly arouse the patient. With it there is dilatation, later contraction, of the pupils. The face is congested, the eyes blood-shot, the body hot and copiously bathed in a profuse hot sweat. The pulse, at first full and bounding, becomes rapid, feeble, and compressible. Vomiting and purging are present in the greater number of cases; the urine is scanty, albuminous, and finally suppressed; breathing becomes labored and oppressed. Wood points out that the whole body is apt to exude a peculiar odor, which is especially strong in the faecal discharges. The most characteristic symptom is the marked elevation of the temperature, which is rarely below

108° in cases sufficiently severe to be marked by unconsciousness, and which may reach 112° or 113°.

Death may occur in an hour, or less, but more frequently not for twenty-four or thirty-six hours; it is due to asphyxia or failure of respiration and of the heart.

Less characteristic is the mild form of sunstroke described in India as "ardent continued fever" and observed in the southern part of this country. It consists of a continued fever with high elevation of the temperature, great prostration, tendency to involvement of the nervous system, and a typhoid state.

The prognosis, in America, is favorable; in India the cases are liable to prove fatal from a sudden development of true and severe thermic fever.

It is now thought that many cases of cholera infantum, occurring during the extreme heat of summer in the large American cities, characterized by cerebral involvement, delirium and coma, are in reality cases of thermic fever.

The diagnosis rests upon the history of the case and the remarkable elevation of the temperature.

The prognosis depends upon the promptness with which treatment is begun, chiefly upon the success had in reducing the temperature, and upon the effect of this reduction of temperature upon the nervous symptoms. Recovery may be expected if the fever falls and consciousness returns. The recovery may not be complete; there may be left permanently partial loss of memory and impairment of the mental faculties, amounting to a mild form of insanity; in others there are convulsions of an epileptiform type and symptoms of chronic cerebral inflammation. Inability to bear exposure to even moderate heat is one of the commonest sequels of thermic fever, and it is always advisable to carefully protect persons who have suffered from sunstroke against avoidable exposure to heat, even of very hot rooms; abstinence from alcoholic stimulants should also be enjoined upon them.

Treatment.—Prophylaxis consists of such prudential measures when exposure to great heat is unavoidable as are within the reach of the majority of people; these include moderation in the use of stimulants and frequent draughts of cool, not ice-cold, water for the purpose of promoting perspiration and of keeping the bodily temperature as low as possible; Wood ad-

vises the addition of claret or some other substance which mildly stimulates the gastro-intestinal tract and the skin. The habit, common among farmers and teamsters, of wearing in the crown of the hat plantain, or other large, leaves and of occasionally changing them, is excellent in its way.

In all cases of sun-stroke, whether mild or severe, the sick person should at once be carried into the shade of a tree or house, or placed under the cover of an ambulance, and energetic measures taken to reduce the temperature. If nothing better offers, the larger portion of the clothing may be removed and the patient be freely doused with water from the pump or hydrant. In cities, where cases of sunstroke occur constantly during the heated term, an ambulance will at once be called, and the patient removed to the hospital. The value of every moment is great, and not an instant should be lost; life itself may depend upon promptness of action.

Quick reduction of temperature is brought about by stripping the patient and freely and perseveringly rubbing the body with large pieces of ice or by putting him at once into a cold bath (50° F.), occasionally adding to the water pieces of ice in order to maintain a low temperature. A reliable thermometer should be kept in the mouth or rectum, and the patient be removed from the bath when the instrument registers 101° F. It is, however, a question if in the majority of cases as good results would not be obtained by a prolonged bath in simply cool, or even slightly tepid, water. While it is not wise to ignore the experience of those who in hospital practice claim to have demonstrated the necessity of ice and ice-cold baths in acute thermic fever, we yet know that in other fevers characterized by a very high temperature tepid baths promptly and permanently reduce it, and that in many cases private practitioners have found this means thoroughly efficient. Alcoholic stimulants may be demanded even while the patient is in the bath tub, and hypodermic injections of strychnine or digitalis may be indicated by the symptoms.

The bath may be repeated, but there is much danger of over-doing; the temperature and general condition of the patient must be carefully considered.

If there is immediate danger of apoplexy, free venesection is advised. Violent convulsions may call for chloroform or hypo-

dermic injection of morphine. Internal medication is of comparatively little use at the time of immediate urgency, although drugs which reduce the bodily temperature are to be considered. However, after the patient has recovered from the acute attack, but suffers from its effects, duly indicated remedies, with the observance of quiet, avoidance of further exposure, and a light diet, will prove of far greater value than the repeated "local bleedings and persistent, merciless counter-irritation, especially by means of the actual cautery" (Wood) which are by some authorities considered of so much value when the meninges are in a state of chronic inflammation.

GLONOINE is the most important remedy at our disposal. It stimulates the vaso-motor centres and the heart. It causes symptoms of violent congestion to the head, threatening apoplexy, and symptoms of meningeal irritation or inflammation. There is great throbbing fulness in the head; congestion of the conjunctiva, disturbances or loss of vision; frightful pain in the head, which is pulsating and throbbing; he loses knowledge of his whereabouts, does not recognize familiar objects, as his house or the street in which he lives; there is constricted, labored breathing; unconsciousness; convulsions.—*VERATRUM VIRIDE* has a powerful effect in quieting the action of the heart and lowering the temperature. Symptoms of cerebral hyperæmia and meningeal irritation are prominent, with a tendency to convulsive action. In practical usefulness here it ranks next to GLONOINE.—*BELLADONNA* is very useful in the treatment of cerebral congestion, with characteristic headache, dizziness, etc.; it is serviceable in congestive headaches brought on by great heat in the summer, but they are not as intense as the headaches which call for *NITRO-GLYCERINE*.—*OPIUM*. Cerebral apoplexy, with deep coma, stertorous breathing, cold extremities, sometimes much twitching and jerking of muscles, purplish face, hot sweating.—*GELSEMIUM* is of great value when blinding headaches with great prostration remain as a sequel of sunstroke. It is also important in the milder cases, when the patient is conscious of being overcome by the heat.—*AMYL NITRITE* resembles GLONOINE, but does not in efficiency equal the latter during an acute attack. In the cases, however, where there remains after recovery from the immediate attack very severe pain in the head, with a sensation as though the

blood were surging in great waves to the brain, with difficult breathing and oppression throughout the chest, and a sense of choking, it is eminently useful.—FERRUM PHOSPHORICUM is helpful when violent headache with symptoms of cerebral congestion, fiery-red face, great dizziness, and often vomiting, result from exposure to the sun. (LACHESIS, STRAMONIUM and CIMICIFUGA.) Hale recommends ZINCUM PHOS. when there is swimming in the head, uncertain gait, difficulty in concentrating one's mind, and depression of spirits.

OBESITY (Polysarcia).

A tendency to obesity prevails in certain races and families. It usually shows itself after middle life, but is not infrequently seen in the young, particularly when over-eating and aversion to physical exercise are allowed to be freely indulged. Among the immediate causes the most important are over-eating, lack of sufficient exercise, and the free use of beer and alcoholic liquors. It is, however, a fact that many obese persons are not only moderate eaters, but have voluntarily and in vain practiced great abstemiousness to circumvent an inherited tendency to excessive corpulency.

Aside from the necessary exercise of moderation in eating and drinking, obesity need not excite uneasiness unless it is sufficient to become burdensome by causing wheezing and shortness of breath from moderate exertion or from going uphill, or unless there is interference with the normal functions of the heart.

The treatment of obesity consists of abstinence from alcoholic drinks, beer and porter, a properly regulated diet, and systematic physical exercise. In providing the latter it must call into action all the muscles of the body, should be maintained persistently, and should be increased daily, as the strength of the subject allows, inducing free perspiration, but stopping short of producing exhaustion. Agreeable exercise out-of-doors is to be preferred. It should be followed by a bath, brisk rubbing, and rest.

The diet best suited to the needs of this class of people has

been made the subject of exhaustive study, of which a very complete resumé may be found in "Hare's System of Therapeutics." The carbohydrates and fats are no longer considered directly responsible for the over-production of fat in the human system, but their consumption is still, for evident reasons, allowed in limited amounts only.

Of the numerous methods practiced for the cure of obesity, those of Banting, Oertel, Schweningen, Ebstein and Yeo are best known. Banting reduces the amount of food and liquid taken, and excludes fats and carbohydrates. Oertel allows only a total of about thirty-six ounces of liquid per day, uses a diet composed largely of proteids, employs means to produce copious sweating (Turkish bath), and pays especial attention to systematic, carefully regulated exercise. His plan is particularly applicable to persons suffering from fatty heart. Schweningen differs from Oertel chiefly in that he allows no liquids at the table nor for two hours after eating. Ebstein rapidly excludes all carbohydrates, but recommends the free use of fats. Yeo limits the albuminates in the form of animal food; reduces to a minimum starchy and farinaceous foods, prohibits sugar, allows a moderate amount of fat. He forbids drinking with the meal, but recommends the free use of hot water and of aromatic beverages after digestion has been completed, between meals. Beer, porter and sweet wine are excluded; alcohol can be taken only in very small amounts; hock, still Moselle or light claret may be drunk with some alkaline table water. Lean meat, game, poultry, eggs and fish (excluding salmon, eels and mackerel) are allowed once a day, the meat not to exceed six ounces; two eggs, lightly boiled or poached, may be taken at one other meal. Bread must be cut in thin slices and thoroughly toasted on both sides. Hard tack is allowed. Soups as a class must be avoided. A diet of *skimmed* milk may be adopted; otherwise milk is not to be used save very sparingly. Farinaceous puddings and pastry are forbidden. Fresh vegetables and fruit is allowed. Throughout, exercise on foot is necessary. The bowels are to be kept open by saline purgatives.

While many symptoms arising from obesity may come within the curative range of the indicated remedy, the condition *per se* is not amenable to treatment by drugs. Attempts to cure

obesity by the use of thyroid extract, after the manner recommended under "myxœdema," have not been universally successful, even though cases have been put on record in which good results were claimed. The same may be said of the juice of the phytolacca-berry. I have not seen a case in which permanently good results were obtained from the use of "phytoline," so-called. In my own hands, in four patients who were exceedingly anxious to find relief, and who took this preparation for a considerable length of time, the results were absolutely negative. I took five ounces of phytoline, observing the usual rules of proper diet and exercise, and was forced to record an increase in weight of from 224 lbs. to 238 lbs.

PART VI.

DISEASES OF THE DIGESTIVE
ORGANS.

PART VI.

Diseases of the Digestive Organs.

DISEASES OF THE MOUTH.

STOMATITIS.

(1) *Catarrhal Stomatitis* (simple, acute, erythematous stomatitis).—The simplest form, frequently seen in young infants and children, though by no means limited to them. It is usually the result of local irritation, and may be (a) primary (from cold, use of irritating drugs, too hot or too cold food, lack of cleanliness, abnormal dentition, broken tooth, in adults from the too frequent use of tobacco); (b) secondary (from gastric or intestinal affection, disease of tonsils or pharynx, fevers, etc.).

The inflammation of the mucous membrane may be circumscribed or diffuse. The mucosa at first is dry, glistening, bright-red; later increased secretion takes place, with swelling and moderate heat in the mouth. The tongue is swollen and coated white; indentations of the teeth are seen on the tongue and cheeks. If there is fever, it usually is very moderate; exceptionally it is high, and the tongue then becomes dry, red, fissured, with dryness and redness throughout the mouth. Pain constitutes the most striking symptom. The infant frets and worries; it drops the nipple of the breast or bottle as soon as it begins to nurse; older children complain of painful mastication and deglutition. Copious dribbling of saliva is

often seen in young subjects. The breath is unpleasantly sweetish, at times sour. Appetite is not much affected. Occasionally, in severe cases, slight indigestion, diarrhœa, swelling of the submaxillary glands and, in very nervous children, convulsions have been noted.

The average cases recover quickly, usually within a week. Relapses are frequent, and are chiefly to be dreaded because they interfere with the proper feeding of the child and thus tend to weaken it.

Treatment is prophylactic in so far as proper care of the mouth of young infants (washing it with cool water, swabbing it with absorbent cotton) does much toward preventing the occurrence of this disease. A child being affected, the cause must be ascertained and, if possible, removed. A mouth-wash of boric acid (1 to 3 per cent.), bicarbonate of sodium (5 per cent.), salicylic acid (0.5 per cent.), or of a weak solution of the fluid extract of golden seal is very useful. In chronic or very severe cases, the use, after thoroughly cleansing the mouth, of a solution of nitrate of silver (2 to 4 grains to the ounce) is recommended.

Consult BELLADONNA, ACONITE, etc.

(2) *Apthous stomatitis* (vesicular or follicular stomatitis, canker) may occur at any age, but chiefly in young children up to the age of the second dentition. Its characteristic feature consists of yellowish, grayish-white patches on the oral mucous membrane, chiefly on the lower lip. The affection occurs as the result of lack of proper care of the mouth, bad physical habits generally, and debility of the system from any cause, such as acute diseases like measles, scarlet fever, diarrhœa, pneumonia, or wasting diseases, as cancer and tuberculosis; occasionally persons in perfect health suffer from it.

A small elevation of the mucous membrane, with white centre and red margin, in the course of about twenty-four hours changes into a creamy patch, which in appearance resembles a superficial ulcer surrounded by a red margin, rarely larger than a split pea, and usually smaller. It heals by the formation of a new layer of epithelium from underneath or from the periphery, and without leaving a scar. These patches, in exceptionally severe cases, may become confluent.

In the majority of cases there is slight, if any, constitutional

disturbance. As in the catarrhal form, restlessness and fretfulness are common in young infants, and difficulty of nursing in babies, or painful chewing and swallowing of food in older children, must be expected. Increased buccal secretion and slight fever are generally present. In the severe cases, commonly of the confluent type, there may be considerable gastro-intestinal irritation, probably from extension of the disease, with vomiting, diarrhoea and fever. When the stomatitis occurs in connection with profound constitutional diseases, as the expression of a cachexia, it is secondary, symptomatically, to the primary disease, but, interfering with eating and digestion, may render the prognosis in such cases more serious than it otherwise would be. Simple cases readily yield to treatment.

Treatment.—Cleanliness, especially washing the mouth after eating, is important. Mouth-washes are useful, as solutions of permanganate of potash (1 per cent.), borax and glycerine, chlorate of potash, and astringents generally. In severe cases the sore should be touched with nitrate of silver, though caution in the use of caustics must be exercised, lest they give rise to extensive ulceration. I have found the best results from the use of the fluid extract of *Coptis trifolia* (gold thread), from forty to sixty drops to the ounce of water; *Hydrastis* also has rendered good service.

Consult: *ÆTHUSA CYNAP.*, *ARSENICUM*, *APIS*, *ARUM*, *BAPTISIA*, *BORAX*, *HYDRASTIS*, *IODUM*, *MERCURIUS VIVUS*, *NITRIC ACID*.

(3) *Parasitic stomatitis* (thrush; mycotic stomatitis) is caused by the presence of the *saccharomyces albicans* (*oïdium albicans*, *oïdium lactis*), one of the order of yeast fungi. "It develops and spreads in the form of spores between the layers of epithelial cells. Mycelial threads now grow outward and, especially, inward toward the connective tissue." The tongue (dorsum and edge) is most frequently the seat of the affection, but it is common on the cheeks, lips and hard palate, and may invade the fauces, pharynx and gastro-intestinal mucous membrane. It has been found in the internal organs (liver, lungs). It first appears as slightly raised, pearly-white spots, looking like curdled milk, on the mucosa, which rapidly increase in size and coalesce. They are easily removed, exposing the underlying mucous membrane, which may be normal or raw and super-

ficially ulcerated. Sometimes the entire buccal mucous membrane is thus covered.

The disease occurs at any age, though chiefly among young children. It is distinctly contagious, and thus may readily be communicated by an infected nipple, as frequently happens in large nurseries for young children. The existence of catarrhal, or any other form of, stomatitis is an important predisposing cause. Improper feeding, lack of cleanliness in the mouth, fermentation of remnants of food in the mouth and existing gastro-intestinal irritation are important ætiological factors in children. Among adults the affection is oftener seen in connection with cachectic states, as in the late stages of fevers, diabetes, etc.

The symptoms are those of other forms of stomatitis, arising chiefly from the soreness of the mouth. Sometimes the gastro-intestinal symptoms are very pronounced, and in rare cases the œsophagus is filled with the parasitic mass, making swallowing practically impossible.

The diagnosis is easy. The thrush looks like curdled milk, but is not as easily removed. In *aphthous* stomatitis there are first vesicles, then patches or ulcers, usually well defined; moreover in thrush the mouth is dry, while in *aphthous* stomatitis there is hypersecretion. Positive diagnosis is made by microscopic examination for the parasite.

The prognosis is good, save when the disease appears as the expression of a profound cachexia.

Treatment.—Prophylaxis consists of measures to keep the mouth clean and sweet and taking pains, especially when there is danger of contagion, to sterilize all media of possible communication of the fungus. Alkaline mouth-washes and sprays are useful in preventing and curing the affection. Thrush having appeared, the fungus should be removed, gently, and the parts carefully washed with a solution of bicarbonate of soda, one drachm to a teacupful of water. Washing, and especially spraying, with such solutions as borax (20 grs. to the ounce), sulphite of soda (30 to 40 grs. to the ounce), salicylate of sodium (20 grs. to the ounce) is of great service. Borax and glycerine, peroxide of hydrogen and permanganate of potash are also very useful. It is well to reduce the amount of starch and sugar in the food, in order to lessen fermentation and its consequences.

Reliance, however, is to be chiefly placed upon constitutional measures, including every means to improve the general health of the patient. The remedies to be consulted are: ÆTHUSA, ARSENICUM, ARUM TRIPH., BAPTISIA, BORAX, HYDRASTIS, IODINE, MERCURIUS VIVUS, NITRIC ACID, CARBO VEGETABILIS, HEPAR SULPH., KALI BICHROMICUM, KREOSOTUM, LACHESIS, MERCURIUS CORROSIVUS, STAPHISAGRIA, SULPHUR, SULPHURIC ACID.

(4) *Ulcerative stomatitis* (fetid or phlegmonous stomatitis; putrid sore mouth) occurs most frequently between the fourth and tenth year, very rarely earlier. A specific cause is strongly suspected, but has not yet been found. There is evidently a local cause at work (bad and neglected teeth, teeth suffering from caries or the presence of tartar, catarrhal or other form of stomatitis) which acts upon a constitutional predisposition to the affection. Improper feeding, general neglect of proper rules of living, a constitution enfeebled by some exhausting acute disease, or some seated, chronic affection, as syphilis or rickets, create this predisposition. Certain drugs, as mercury, lead, copper and phosphorus, give rise to a form of ulcerative stomatitis. The disease occurs oftener in the damp weather of spring and fall. When large bodies of men are exposed to unsanitary influences, as in camps, prisons and similar institutions, it assumes the form of an epidemic.

The disease begins at the margins of the gums, usually on one side (left), of the lower jaw, eventually extending to the cheeks, lips and edges of the tongue. There is great hyperæmia of the affected mucous membrane, with swelling, redness and bleeding. Ulceration takes place along the free border of the gums, appearing like a narrow, yellowish line, the ulceration rapidly broadening and deepening, with necrosis of the bony tissues and subsequent dropping out of the teeth. Ulcers may also form on the lips and cheeks, at times of considerable size, with a soft grayish centre and considerable infiltration of the surrounding mucous membrane, giving its edge an appearance of thickening.

These local symptoms are accompanied with copious, blood-tinged salivation, foul and gangrenous odor from the mouth, swollen tongue, fretfulness, sleeplessness, fever of varying degree, and swelling of the submaxillary glands. In severe cases nausea, vomiting and foul diarrhœa may occur. The difficulty

of taking nourishment is great; hence emaciation and bodily weakness are almost always present.

The so-called "mercurial stomatitis" which follows the administration of mercury in some form, not necessarily in large doses, presents a clinical picture so closely resembling ulcerative stomatitis that it may be classed under this heading. The chief differential feature is an early and pronounced metallic taste, more copious salivation, and in exceptionally bad cases quite extensive necrosis of the (lower) jaw. It is now a comparatively rare affection, and is best treated with chlorate of potash internally and in form of a mouth-wash.

The diagnosis of ulcerative stomatitis is not difficult. *Aphthæ* may resemble its first stage, but, unlike ulcerative stomatitis, involves the pharynx and is more superficial. *Noma* is much more destructive and has extensive tumefaction and induration of the cheek. It can hardly be mistaken for the *ulcers* in the mouth of *nursing women* which develop from the mucous follicles and, though painful, are easily controlled by the application of nitrate of silver.

The *course* of the disease is tedious, particularly so when it occurs in connection with rickets or syphilis, or when extensive necrosis of the bone has taken place.

The *prognosis* under proper treatment is good, although recurrences are not unusual. *Noma* exceptionally occurs as a complication, and renders the prognosis serious.

Treatment.—The necessity of proper care of the mouth and of observing the laws of hygiene as prophylactic measures are as apparent as that of guarding against infection. The actual treatment, strongly indorsed by the best authorities of the dominant school, consists of the internal use of chlorate of potash, in doses of three grains every three or four hours to a child five years old, and of a mouth-wash of 15 to 20 grains of the same agent to the ounce. If in exceptional cases this treatment fails, permanganate of potash (3 grs. to the ounce) or nitrate of silver (20 grs. to the ounce) are applied to the sores by means of a brush. Of course, all dead tissues must be removed.

Consult: NITRIC ACID, MERCURIUS SOLUBILIS, PHOSPHORUS, ARSENIC, LACHESIS, KALI BICHROMICUM, BAPTISIA, ARUM.

Gangrenous Stomatitis (*noma*, *cancrum oris*, gangrene of the

mouth) primarily affects the gums and inner surface of the cheek; it is characterized by tendency to gangrene, with extension into, and destruction of, adjacent structures, and a large mortality rate.

It is a rare disease, not confined to any age, but showing a decided preference for girls from two to five years old. Cases probably occur oftener in damp seasons and countries.

The existence of great bodily weakness, profound cachexia or physical depravity, such as results from severe, and especially infectious, disease, in children brought up under unhealthful surroundings, almost seems a necessary ætiological factor. Strong, hearty children are practically exempt. It is stated that at least one-half of all the cases follow measles; it has been known to follow in the wake of scarlet and typhoid fever, and may complicate ulcerative and aphthous stomatitis.

The primary seat of the affection is the mucous membrane of one cheek or of the gum; it is rarely seen on both sides. An ulcer develops, spreading with startling rapidity in every direction, and dipping deep into the tissues, with diffuse swelling of the adjacent parts, and showing gangrenous disorganization of the affected tissue either from the very beginning or within a very short time. The cheek often is perforated, and the destructive process may rapidly involve the face and mouth, eating away the cheek, lips, tongue, palate, even the eye and ear; attacking the jaw, extensive necrosis may result, with loss of teeth and of the bone itself. In mild cases, perforation of the cheek, with fistulous ulcer, marks the extent of the disease; in the severe and more frequent cases the extensive involvement described is seen. "The rapidity of the changes varies considerably. Perforation may take place in twenty-four hours, but oftener after three or four days. It may, however, not occur for two weeks. In rare instances I have seen the gangrenous process terminate favorably without perforation of the cheek" (W. Pepper).

The local disease is accompanied with severe constitutional symptoms. Gangrenous odor from the mouth is present from the first. There is usually little pain. Fever, however, of a septic character develops soon, and the temperature may reach 104°. The pulse is rapid and weak. Great depression soon sets in, followed by wakefulness and delirium. Diarrhœa is

present in many cases, but the stomach is rarely disturbed, appetite being maintained throughout and vomiting rarely affecting the patient. Diphtheria, aspiration pneumonia, and gangrene of the parts (lung, palate, œsophagus, anus, genitals or extremities) may complicate the case, death from exhaustion or collapse usually taking place within a fortnight.

The diagnosis presents no difficulty. *Anthrax* extends from without to within. Severe *ulcerative stomatitis* may lead to extensive destruction of tissue, but lacks the characteristic gangrenous odor and appearance.

The prognosis, always grave, depends largely upon the extent of the lesion and the presence of complications. If confined to the gums, the prospect is favorable. It is, however, stated that the disease is fatal in at least three-fourths of all the cases.

Treatment.—The treatment is largely surgical, embracing the prompt use of powerful caustics for the removal of diseased tissue, the protection of sound structures, and the prevention of septic matter infecting lungs and stomach or the system at large. Antiseptic dressings are imperatively demanded. Pepper recommends that the following be smeared freely over the face and neck: Rcp.: iodoformi, grs. xl; ichtyol, ʒi; lanolin, ʒij; unguent. petrol., q. s. ad ʒi. M. f. ungt. Close attention is to be paid to the diet, which must be concentrated and nourishing. Stimulants are well borne and may be used freely.

Consult: ARSENICUM, MERCUR. CYANAT., MERC. CORROSIV., KALI CHLORICUM.

Therapeutics of Stomatitis.—ACONITE. Restlessness; fever; thirst; dryness and heat of the mouth. In the simple form.—ÆTHUSA CYNAPIUM. Aphthæ; thrush; dryness of tongue; sensation of pungent heat in the mouth and throat, with great difficulty of swallowing. Indicated chiefly by the presence of gastro-intestinal catarrh, with vomiting of curdled milk and presence of curdled milk in the stools.—APIS. Diphtheritic stomatitis. History of some exanthematous fever. Mucous membrane of the mouth bright-red, swollen, and covered with small blisters; feels scalded; viscid, tough, frothy saliva; little thirst.—ARSENICUM. In the serious cases of aphthous, ulcerative or gangrenous stomatitis. Even in comparatively light cases the characteristic symptoms, as burning pain, great

weakness, restlessness, etc., are present when ARSENIC is indicated. Proving's give, among others, the following: gums swollen, bleeding, painful to touch; gums spotted white, covered with membrane; aphthous ulceration; burning pain in the affected parts; painful blisters in the mouth and on the tongue; the tongue swollen, whitish, bluish-red; tongue brown and dry; tongue feels scalded and blistered. Bloody saliva. Fetor of breath, from ulceration of the gums. It is one of the few remedies which may be exhibited with hopes of affording relief when sepsis exists or the malignant tendency is pronounced, with collapse, anxiety and fear of death, cold and hippocratic countenance, ashy in color, with blue rings about the eyes, coldness and cold sweat of the face and body, diarrhœa, and other evidence of a low state.—ARUM TRIPHYLLUM. The mucous membrane is intensely inflamed; the entire buccal cavity is raw, sore, bleeding; burning pain in the tongue; the soreness in the mouth is so great he cannot be induced to take food. Swelling of (left) submaxillary gland. Itching at the lips and nose; putrid odor.—BAPTISIA. Physical depravity. Teeth and gums dark, purple, swollen, foul, and ooze blood. Foulness of breath; foul ulcers in the mouth, which refuse to heal; profuse salivation; tongue thick, yellow or brown in the center, with red, shining edges; great weakness, low delirium, foul diarrhœa, typhoid state. Stomatitis occurring from low fevers. Mercurial stomatitis.—BELLADONNA. Of service only in exceptional cases of catarrhal stomatitis, with considerable restlessness and fever.—BORAX. One of our best remedies in aphthous stomatitis, especially in nursing children, with great heat in the mouth and excessive soreness; the ulcers bleed from slight touch and when eating; thirst and vomiting; "dread of downward motion."—CARBO VEGETABILIS. Great prostration. The gums retracted, spongy, bleed easily; tendency to collapse, with cold tongue, offensive odor from the mouth; brown, yellow, slimy diarrhœa.—HEPAR SULPH. White aphthous pustules on the inside of lips, cheeks and tongue, with pain, worse from touch and drinking; ulcerations with lardaceous base. Sour, metallic taste; sticking pain.—HELLEBORUS NIGER. Mouth full of flat yellow ulcers, with elevated gray edges or red, swollen base. Carrion-like odor: salivation; glands under the jaw and on the neck swollen.—HYDRASTIS. Aphthæ in chil-

dren; great dryness of the tongue, with feeling as though it had been burnt; tongue dark-red, with raised papillæ; peppery taste in the mouth, sticky sensation in the mouth; presence in the mouth of sticky, ropy saliva which can be drawn out in long shreds. Mercurial stomatitis.—**IODUM**. Small, ash-colored, painful ulcerations on the gums; gums red and swollen, receding, bleed easily; profuse, fetid ptyalism; offensive nasal catarrh; glandular swellings; patient thin, scrawny.—**KALI BICHROMICUM**. Fat, sluggish children. Gums livid, sensitive, ulcerated. Tongue coated yellow or yellowish white. Burning, stinging pain in the tongue. Ulceration of the soft tissues, eating deeply; profuse ptyalism; stringy mucus in the mouth; languor. Said to be useful in syphilitic ulceration in the mouth.—**KALI CHLORICUM**. Gangrenous ulceration in the mouth. The mucous membrane is red and swollen; ulceration in lips and cheeks, with gray base. Profuse flow of acid saliva. Throat red and œdematous; submaxillary glands swollen. "It has been found extremely useful in gangrene of the mouth, nearly every case having been cured at the Five Points Hospital, New York, where it was used internally and locally." (T. F. Allen)—**KREOSOTUM**. In the lighter cases with a spongy, scorbutic condition of the gums, constant oozing of blood from the gums, putrid odor from the mouth, hard swelling of the glands, and decay of the teeth.—**LACHESIS**. Gums bleeding, swollen, spongy, dark, bluish-red, painful. Aphthæ. Bluish ulcers, sensitive to touch, with ichorous, offensive discharge. Tongue red, dry, blistered, or tip red and center brown; or red strip in the center. Copious flow of saliva. Great fetor from the mouth. Dark, offensive stool. Urine smells strong. General weakness and tremulousness. Gangrenous tendency. Typhoid state.—**MERCURIUS**. Gums unhealthy, spongy, pale, receding, bleeding. Unhealthy, fetid odor from the mouth. Ulcers and pustules in the mouth, on the gums. Tongue swollen, flabby, bearing upon it the imprint of the teeth. Copious and bloody salivation. The ulcers spread rapidly and superficially. Sharp sticking pains in the throat upon swallowing. Teeth loose, inflamed, sore. (**MERC. SOLUB.** in light cases; **MERC. CYANAT.** and **MERCUR. CORROSIV.** adapted to cases where there is intense action, tending to destruction of tissue, as in gangrenous stomatitis.)—**NITRIC ACID**. Gums

white, swollen, bleeding; blisters and vesicles on the lips; sores on the inner cheek; yellow ulcers, with pricking pain as from a splinter; teeth loose; fetor; profuse ptyalism. The saliva is fetid, acid, and irritating; it causes sores where it touches the lips or chin.—PHOSPHORUS. Clinically of especial value when the bone is affected.—STAPHISAGRIA. “Aphthæ. Blisters changing into cancer sores, with bluish-red or yellowish base. Gums pale, white, ulcerated; painful excrescences on the gums and in the mouth, which bleed easily. Mouth and tongue blistered and ulcerated.” Cervical glands swollen. Teeth crumble to pieces. Child looks sickly; pale face, with dark rings about the eyes; peevishness; violent temper.—SULPHUR. Frequently useful as an intercurrent in tedious cases when there is evidence of psora.—SULPHURIC ACID. “Aphthæ occurring during protracted diseases, especially in children with marasmus, with salivation, sour vomiting, stools like chopped eggs.” T. F. Allen.—Great weakness and exhaustion. Gums yellowish-white.

DISEASES OF THE TONGUE.

The morbid conditions of the tongue which are of practical interest to the physician are: paralysis, inflammation, simple ulceration and malignant ulceration or cancer of the tongue. Of these, paralysis has been discussed in another section; cancer of the tongue belongs to the field of surgery.

GLOSSITIS.

Glossitis or inflammation of the tongue may be superficial or parenchymatous, and in either form acute or chronic.

Superficial inflammation is the result of trauma (broken teeth, the action of some local irritant, as corrosive substances) or is seen in connection with some disease of the mouth, pharynx or tonsils, or in fevers or gastric affections. The *parenchyma* may become involved from a primary superficial glossitis, in persons with a predisposition to involvement of deep structures, causes which otherwise would give rise to superficial inflammation at once affecting the substance of the

tongue; or it may follow such diseases as erysipelas, tuberculosis, syphilis, scurvy, gout, rheumatism. In the past, the use of mercury in large doses was a prolific cause. Occasionally, epidemics of glossitis have occurred.

The symptoms in cases which involve the superficial tissues only are insignificant; there is often a sense of burning soreness and some pain upon eating. Acute inflammation of the parenchyma of the tongue is characterized by severe pain and immense swelling of the tongue, often beginning at the root and developing with startling rapidity. Within a few hours the tongue will completely fill the mouth, protrude from the lips, depressing the jaw, rendering swallowing almost, and often quite, impossible, even threatening suffocation from pressure upon the epiglottis and soft palate. The tongue itself is dry, hard, immovable, exceedingly painful. There is swelling of the submaxillary and cervical glands, increased salivary flow, fetor of breath and fever.

The course of the disease is rapid. Resolution may take place in a few days; or the acuteness of the inflammation may subside, the swelling decrease, and a chronic hypertrophy remain. Or an abscess may form, the evacuation of which will give immediate and great relief. In other cases gangrene may occur as a dangerous complication; or death may result, usually from suffocation.—Chronic parenchymatous glossitis is characterized by a moderate enlargement of the entire tongue or of parts of it; there is slight pain and some difficulty of speaking and swallowing, depending upon the degree of enlargement.

The diagnosis is easily made. The intensity of the local symptoms and the rapid course of the affection are decisive.

The prognosis is unconditionally favorable in the acute superficial form; it must be guarded, so far as rapid and permanent cure is concerned, in the chronic superficial form, since recurrences from slight provocation, as some gastro-intestinal disorder, are exceedingly common.

Acute parenchymatous glossitis must be considered a serious affection, with probably favorable termination if properly treated, but involving the possibility of death from suffocation. The formation of an abscess, though not without danger and increasing the duration of the attack, has a favorable effect upon the termination. If glossitis occurs as an expression of sepsis, the prognosis is grave.

Treatment.—In the superficial forms early demulcent washes (as slippery elm) and astringents (as tincture of myrrh) may be used. Bits of ice may be kept in the mouth, as both comforting and helpful. In the parenchymatous form more energetic measures must be employed, including free leeching under the jaw and deep scarification of the tongue. The tongue must be kept moist by sprays (borax, bicarbonate of sodium) and washed freely for the removal of secretions and epithelium. The formation of an abscess can usually be detected by the appearance of a circumscribed, well-defined swelling; it must be opened freely. It may be necessary to administer food by enema or nasal tube.

Therapeutics.—**ACONITE.** High fever; dry, hot skin; quick, sharp pulse; intense, agonizing restlessness, headache, possibly delirium; piercing, tingling, sticking pain in the tongue.—**APIS.** Tongue red, puffed, swollen; stinging pain in the tongue; blisters on edge and dorsum.—**ARSENICUM.** Burning, like fire, in the tongue; gangrenous and malignant tendency.—**BELLADONNA.** Tongue *hot*, dry, painful to touch; feeling on the tip as though it were blistered, with burning pain, especially when touched. Papillæ dark-red, swollen edges and tip pale red. Violent congestion.—**CANTHARIDES.** Tongue fiery red, blistered, excoriated; burning pain in the mouth and throat; burning, smarting vesicles in the mouth.—**LACHESIS.** Tongue blistered and ulcerated, especially on the tip; tongue dry, red, black, stiff; tongue cracked, mapped; gangrene.—**MERCURIUS.** Hard swelling of the tongue, with ulcerations on the edge; indentations on the tongue from the teeth; severe pricking, burning pain in the tongue; salivation; foul breath.

For the *chronic* form consult also: **CONIUM**, **CUPRUM**, **BENZOIC ACID**, **CALCAREA CARBONICA**, **CARBO ANIMALIS**, **LYCOPodium**, **SILICA**. If the disease results from the abuse of mercury: **NITRIC ACID**, **HEPAR SULPHUR.**, **KALI CHLOR.**

For *Cancer of the Tongue* study: **ARSENICUM ALB.**, **ARSENICUM IODAT.**, **HYDRASTIS**, **LACHESIS**, **NITRIC ACID**, **CARBO VEGETABILIS.**

SIMPLE ULCERATION OF THE TONGUE.

Practically a "molecular necrosis," caused by traumatism (from broken teeth, tartar on the teeth, prick by some sharp

instrument) or the result of indigestion from errors in diet, dyspepsia, etc. The ulcer is usually seen on the frænum of the tongue, often on the tip, less frequently on the dorsum. It is flat, usually superficial, covered by a dirty yellowish slough and surrounded by a limited area of inflammation. There is much tenderness to touch, at times considerable burning pain, more or less offensive odor from the mouth, and in some instances enlargement of, especially the sublingual, glands. When depending entirely upon gastric derangements, the nature of the ulceration is evident from the constitutional symptoms present.

Treatment.—The so-called dyspeptic ulcer will heal when the gastric symptoms have been removed by appropriate treatment. Attention to the mouth, as to perfect cleanliness, and the use of cooling mouth-washes is necessary. Hydrastis, properly diluted, makes an excellent local application. In severe cases the use of nitrate of silver, directly applied to the ulcer, is highly beneficial. The remedies oftenest indicated are: ARSENIC, HYDRASTIS and MERCURY. Consult also BAPTISIA, BORAX, GRAPHITES, NATRUM MURIAT., SULPHUR, KALI BICHROMICUM, NITRIC ACID, LYCOPodium, PHYTOLACCA.

DISEASES OF THE SALIVARY GLANDS.

Ptyalism or hypersecretion and *Xerostomia* or arrest of the secretion constitute the functional disorders of the salivary glands. The former is seen in acute fevers (small-pox), occurs occasionally in connection with certain derangements of the nervous system, sometimes during pregnancy or menstruation, and as the result of the use of mercury, iodine, gold, copper, jaborandi, and other drugs. *Xerostomia* (dry mouth) is infrequent, of unknown origin, and consists of an arrest of the secretions of the buccal and salivary glands, giving rise to excessive dryness of the entire mouth and tongue, which renders speaking and eating very difficult. Osler reports a case which yielded to treatment by galvanism.

Inflammation of the salivary glands is usually of a specific character, and has been discussed. A non-specific inflamma-

tion sometimes occurs during the course of infectious fevers, especially typhoid, as the result of extension of inflammatory action along the salivary duct to the salivary gland. Its tendency is to rapid suppuration and its appearance is an unfavorable symptom. Paget has called attention to a form of parotitis which is seen in connection with diseases or injuries of the abdomen or pelvis, and Gowers speaks of its occurrence in association with facial paralysis.

Ptyalism as a symptom is treated by the constitutional remedy which covers the totality of symptoms. Non-specific inflammation, in addition to the indicated remedy, may require leeching or the use of hot fomentations, and early incision if suppuration becomes established.

DISEASES OF THE PHARYNX.

ACUTE CATARRHAL PHARYNGITIS.

Sore throat or simple angina is an inflammation of the pharyngeal mucous membrane and the underlying structures, and usually involves the uvula, fauces and palate. The chief causes are taking cold, especially from exposure to a draught, sudden chilling, and wet feet. It may arise from local irritation. It affects children oftener than adults, and women oftener than men. It prevails chiefly in spring and autumn.

The premonitory symptoms are shivering and indisposition, with headache, slight fever and aching of the bones, neck and back; at times the attack is ushered in by a chill. Swelling and soreness of the throat then occurs, with sharp, stitching pain, most pronounced when attempting to swallow, the pain frequently shooting into the ear. The voice is thick, the throat filled with tough, stringy mucus, and there may be dulness of hearing. Hoarseness and hacking cough are often present, especially when there is laryngeal involvement. Examination of the throat at first shows a dry, glistening, congested mucous membrane, in places covered with grayish mucus; later, the pharyngeal mucosa is thickened, somewhat roughened, and here and there covered with a sticky, brownish secretion. The

uvula, fauces and palate are congested and inflamed, and the tonsils often covered with a white deposit which is easily removed and leaves the underlying surface intact. Recovery usually takes place in a few days, the glandular swelling, tenderness and pain disappearing gradually or the symptoms ceasing suddenly.

The duration of the attack is from two or three days to a week, or longer. The pharynx may remain sensitive, in which case slight exposure will precipitate a recurrence of the affection, with a tendency to chronic pharyngitis.

Treatment.—The general treatment is simple. It consists of the use of soft, bland food—liquid if most agreeable to the patient—and the exhibition of the indicated remedy. Oil-sprays are soothing; Ivins recommends some fluid petroleum preparation. Tannic acid (fifteen grains to the ounce of alboline or glycerine) as a spray is excellent when there is much œdema. Gargling is practically useless in the case of children.

ACONITE, BELLADONNA, FERRUM PHOSPHORICUM, GUAIAECUM, MERCUR. IODAT. RUB. and MERC. IODAT. FLAV. are oftenest indicated; but consult also: AMMON. MUR., APIS, KALI BICHROM., KALI MURIAT., LACHESIS, PHYTOLACCA, SANGUINARIA, CAPSICUM, LYCOPODIUM, CANTHARIDES, RHUS TOXICODENDRON.

CHRONIC CATARRHAL PHARYNGITIS.

This form of sore throat is characterized “by congestion and relaxation of the mucous membrane of the pharynx, palate and uvula; there is no marked involvement of the follicles, and the morbid process never terminates in ulceration.” It prevails in moist climates and in places where sudden changes in weather are frequent, and finds its victims among all classes. Any condition which weakens the pharynx becomes a predisposing cause, such as repeated attacks of acute catarrhal sore throat or the excessive use of alcohol or tobacco. It is also seen in connection with disorders of digestion and uterine irritation. A chronic attack may assume acuteness from a comparatively trifling cause.

Hypertrophy of the mucous membrane and of the submucous tissues, with enlargement of the glandular structure and hypersecretion, the parts later presenting an irregular roughness,

with scattered patches of atrophied tissue, constitute the characteristic anatomical changes.

The symptoms consist chiefly of dryness, fulness and burning soreness of the throat. In the morning the patient awakens conscious of the presence of mucus in the throat, of which he relieves himself by more or less violent hawking and coughing; this mucus is tough, stringy, thick or thin, sometimes lumpy, and in appearance varied, at times grayish-white, again yellowish, greenish, or bloody. During the day the throat is cleared mechanically or the secretion swallowed with the saliva. The throat feels rough and dry, especially in the evening, and there is occasionally moderate soreness upon swallowing. The voice is slightly rough, husky and under imperfect control; long-continued speaking or singing readily brings out this fact. Sudden dropping of the secretion into the larynx is common and very annoying. Elongation of the uvula is frequently present, and may provoke much coughing, sometimes in violent paroxysms. Chronic laryngitis is a common complication, and becomes the cause of much additional inconvenience and suffering. Unpleasant taste in the mouth and fetor from the mouth are often observed. The general health is not affected.

The prognosis must be guarded as to duration and results of treatment. Some cases yield promptly, while others defy every recourse of the physician. The latter is especially true in scrofulous patients or in those of habitually low vitality.

Treatment.—Thorough cleansing of the affected parts and the persistent use of the indicated remedy, with such measures as promise to improve the general health and to lessen the susceptibility of the patient to take cold, constitute the treatment of chronic catarrh. The latter will be accomplished by ordering an out-of-door life, equally free from unnecessary exposure and from constant "fussing." The use of "wraps" about the neck should be forbidden; if necessary, much patience must be used to gradually accustom the patient to get along without such unnecessary protection. Bathing the throat and upper chest daily at first in tepid, then in cool, and finally in cold, water is to be regularly practiced, the bath to be followed by the brisk use of the Turkish towel. The feet must be kept dry and warm. Cleansing of the parts may be accomplished with the spray or cotton carrier. The following topical applications

are recommended by Ivins: Aqueous hydrastis (crude), kali bichrom. or kali permangan. (1 per cent. solution), soda bicarbon. (5 per cent. solution), eucalyptus (10 per cent.). If these fail, tannic acid, 10 grs.; chloride of zinc, 5 grs.; iodine, 10 grs.; glycerine, one ounce, may be occasionally used.

Consult ALUMINA, CALC. PHOSPHOR., HYDRASTIS, KALI BICHROM., MERCURY, NUX VOM., PULSATILLA, WYETHIA. Also: ÆSCULUS, ARGENT. NITRIC., CEPA, ELAPS, KALI IODAT., KALI MURIAT., MAGNESIA PHOSPHOR., NATRUM MURIAT., IODUM, SULPHUR.

FOLLICULAR PHARYNGITIS.

The essential point, anatomically, is the involvement of the follicles, which become distended, singly or in little groups or chains, each follicle surrounded by a narrow band of inflamed tissue, with engorgement of communicating vessels and exudation from the follicle. The process may be acute or chronic.

In the *acute* form the contents of the follicles are expelled within a few days, the thickly dotted exudations, upon superficial inspection, bearing the appearance of a membranous deposit. The follicle usually returns to its normal state when emptied of its contents; ulceration may result when the parts, from cachexia, weakness or vicious habits, are lacking in recuperative power. The constitutional symptoms are those of acute catarrhal pharyngitis, with rather more severe burning dryness in the throat and more pronounced splinter-like pain; the expectoration also differs somewhat in that it usually is heavier and thicker.

Examination of the throat establishes the diagnosis; in light cases the smallness of the inflamed follicles may cause them to be overlooked; hence the need of care. Recovery usually takes place in a few days; if it is incomplete, the foundation may be laid for the chronic form of the affection.

Treatment consists of internal medication and of such local measures as will relieve the pain and dryness in the throat. Spraying with alboline or liquid vaseline affords much relief; hydrastis and eucalyptus, properly diluted, may be used in the same manner.

Chronic follicular pharyngitis or *Clergymen's Sore Throat*

occurs oftener in men than in women. and attacks especially persons in the early prime of life who are overworked in sedentary occupations and whose vitality is low. The previous occurrence of repeated attacks of acute catarrhal or follicular sore throat, particularly in those of a strumous diathesis, constitutes a powerful predisposing cause. Overexertion of the voice, exposure to cold and irritation of the weakened mucous membrane by mechanical and chemical emanations from various manufacturing processes are common direct exciting causes.

In the early stage there is congestion of the mucous membrane and enlargement of the follicles, varying in size from a millet-seed to a small pea, occurring singly, in groups, or forming a chain. The follicles are transparent or opaque, surrounded by a narrow band of inflamed mucous membrane, which may extend and eventually assume a dry, glistening appearance. The throat looks rough and raw, but removal of the viscid secretion shows the mucous membrane intact. The follicles continue to enlarge, coalescing and forming "broad flattened elevations or long ridges," velvety in appearance and elastic to the touch, extending in various directions and usually surrounded by a network of injected superficial veins. The exudation from them is viscid, hanging in slight threads from the follicles, or covering the parts like a membranous patch; sometimes this exudation appears "cheesy," and in exceptional cases it is chalky or calcareous. When the vault of the pharynx is involved crusts of hardened secretion are seen on the pharyngeal wall behind the soft palate.

Suppuration and ulceration of the follicles may take place on any of the mucous surfaces, especially in cachectic, tuberculous or syphilitic subjects; the erosions which exceptionally result may be followed by more or less bleeding. Alarming, and even fatal, hæmorrhages have been observed in rare cases.

The subjective symptoms in the early stage are not at all severe, consisting chiefly of dryness in the throat, with a sensation of moderate stiffness. Later, symptoms of laryngeal origin show themselves, chiefly hoarseness and cough, with soreness and tenderness in the larynx and arch of the palate. These increase, and the feeling of dryness, now often accompanied by pricking pain, becomes constant and very annoying.

Speaking grows difficult, and the voice is muffled, hoarse and uncertain, its pitch often changing suddenly and in the most unexpected manner; a drink of water relieves. This symptom is especially noticeable in public speakers, and has given rise to the term "clergymen's sore throat," a misnomer, since public speakers constitute but a small proportion of the victims of this affection. Swallowing becomes painful, breathing often labored, and deafness, more or less complete, may result and even prove permanent. The senses of taste and smell are blunted. Throughout, hawking and violent clearing of the throat remain prominent symptoms; in exceptional cases with severe laryngeal complications, cough is so marked a feature that tubercular trouble may be suspected.

General health, in the great majority of cases, is not impaired. Occasionally extensive destruction of the glands and of the adjacent tissues takes place, producing a dry, glistening appearance of the mucous surface—the so-called *pharyngitis sicca*.

The diagnosis presents no difficulty, but since the affection not infrequently is associated with tubercular disease, the specific micro-organism of tuberculosis may be detected.

The prognosis is favorable, but the disease is very unyielding and chronic.

Treatment.—The various general measures already mentioned under catarrhal pharyngitis must be carried out here, and everything done to "strengthen the throat." Cauterization or rough treatment of the parts by caustics is risky and should be discountenanced. Local applications are useful; the iodide of glycerine is especially soothing. Ivins recommends as a gargle: glycerine, 1 teaspoonful; alcohol, $\frac{1}{2}$ teaspoonful; water, 4 teaspoonfuls. HYDRASTIS, SANGUINARIA, PHYTOLACCA, ARGENTUM NITRIC., properly diluted, may be used to advantage.

Moderation and wisdom in the use of the voice are very essential. Public speakers and singers who suffer severely had best give the vocal organs absolute rest, so far as public work is concerned, until the disease is well under control; but it is not advisable to wholly desist from the use of the voice in common speaking or singing. When possible to do so, the advice of an experienced teacher of voice-culture may be utilized to great advantage in determining the proper care and use of the vocal organs.

The most important remedies are: ARGENT. NITRIC., ARSENIC. IODAT., KALI BICHROM., MERCUR. PROTOIODAT., WYETHIA, SANGUINARIA. The following are often useful: ALUMINA, ÆSCULUS, ARGENT. MET., AMMON. BROMAT., CALCAREA PHOSPH., ARUM, HEPAR SULPH., KALI MURIAT., LACHESIS, MERC. BINIODAT., NATRUM MURIAT., NUX VOM., PHOSPHORUS, PHYTOLACCA, PLUMBUM, RHUS TOXICODENDRON.

Therapeutics of Catarrhal and Follicular Pharyngitis.—**ACONITE.** Early stage of an acute attack. Characteristic restlessness, thirst, etc. Parts dark-red. Constrictive dryness and stitching pain in the throat. During dry, cold, windy weather.—**ÆSCULUS HIPPOCASTANUM.** Catarrh of the *gastro-intestinal* mucous membrane, with tendency to constipation and hæmorrhoids. Pharynx and fauces relaxed, puffed, dark-red. Great dryness, burning and scraping in the throat and posterior nares. Sensation in the parts as though they were excoriated, with pricking. Hawking of clear mucus; “droppings” into the throat.—**ALUMINA.** Dryness of throat and huskiness of voice, worse in the morning on first waking. Throat dark-red, relaxed, the follicles inflamed. Uvula elongated and dark-red. Nasal catarrh. Dropping of mucus into the throat. Sensation of fulness in the Eustachian tubes, with “snapping” in them when swallowing. Hawking of thick, tough mucus. Accumulation of thick, tough mucus in the throat. Pharyngitis sicca. Relief from warm drinks and warm food.—**AMMON. BROM.** Pharynx mottled; fauces dark-red and congested. Chronic cough, with scanty, stringy expectoration. Follicular form.—**AMMON. MURIAT.** Acute catarrhal form. Rawness of the pharynx and naso-pharynx. Hard cough, with difficult expectoration of tough, stringy mucus. Burning in the larynx and hoarseness.—**APIS.** Acute catarrhal form. Œdematous, bright-red swelling of all the soft parts of the throat, with feeling of constriction, stinging pain, somewhat difficult breathing and swallowing, fever without thirst, and relief from cold.—**ARGENTUM MET.** Condition chronic. As soon as he begins to talk or sing, easy expectoration of mucus, which looks like boiled starch. Hoarseness.—**ARGENTUM NITRIC.** Chronic sore throat (follicular). The parts look dark-red. Pain as from a splinter lodged in the throat whenever the parts are used. Dryness when beginning to speak. Slight hoarse-

ness. Burning and scraping in the throat. Hawking of thick, tenacious mucus.—**ARSENICUM IODAT.** One of our best remedies in chronic follicular sore throat occurring in phthisical patients. There is much burning rawness and soreness in the throat, with constant scraping and hawking. Its exhibition is demanded by constitutional rather than local symptoms.—**ARUM TRIPHYLLUM.** Especially adapted to cases in which hoarseness and uncertainty of voice are marked, either continuously, or from overexertion, or from cold. The modulations and pitch of the voice are practically beyond control, and are constantly and unexpectedly changing; hence a great remedy for operatic singers and public speakers. In the more aggravated cases the local objective symptoms are well pronounced. There is œdema, violent burning soreness in the mouth and throat, with great aggravation from attempts to swallow; ulceration in the mouth; foulness of breath; profuse secretion, with constant hawking and spitting.—**BELLADONNA.** In acute cases only, with much and bright redness; great dryness and heat, as though scalded; painful swallowing, especially empty; shooting pains in the throat; sense of constriction or contraction; small ulcerations in the buccal cavity, especially on the tonsils; all use of the throat is painful.—**CALCAREA PHOSPHORICA.** "Sensation of dryness and burning in the naso-pharynx during empty swallowing or when swallowing first mouthful of food or fluid, not after; fulness in naso-pharynx, either imaginary or due to the presence of mucus mixed with blood; pure, partly coagulated blood; or yellowish-white, thick discharge." "When swallowing saliva, feels as though the uvula had been swallowed and had adhered to the posterior wall of the pharynx, where it would choke him; only relieved by a repetition of deglutition (Ivins)." Said by R. T. Cooper to be almost a specific for adenoid vegetations.—**CANTHARIDES.** Intense constriction and pain at the posterior aspect of the throat. Throat feels on fire; pain intense, rendering swallowing, especially liquids, almost impossible.—**CAPSICUM.** "Sore throat complicated with rheumatic and gastric ailments, especially of spirit drinkers and smokers, with morbid retching, relaxed uvula, dryness and smarting in the throat." Dark redness of the throat, with burning, pungent sensation in the pharynx, elongated uvula, causing tickling and dry hacking cough, with

free expectoration of mucus from the trachea.—**CEPA.** Soreness, dryness, sensation of cold in the throat; coryza with bland lachrymation and watery, acrid nasal discharge; cough from tickling in the larynx.—**ELAPS.** “Posterior walls of the pharynx covered with crusts or the mucous membrane fissured. Congestive, lancinating, frontal and occipital headache, aggravated by motion and stooping. Complicated with nasal and aural catarrh, especially in children (Houghton).”—**FERRUM PHOSPHOR.** Acute attacks, with considerable fever. The parts are inflamed, dry, red, hot. Red face. Painful swallowing.—**GUAIACUM.** Constantly used in the practice of the dominant school in the acute form, especially of rheumatic origin. Its use, so far, is empirical; its action resembles that of **ACONITE.** It is probable that pricking pain in the posterior throat, very great dryness in the mouth, copious flow of saliva and laryngeal inflammation will prove reliable indications.—**HEPAR SULPHUR.** Throat dry and raw; pain as from a splinter or fish-bone sticking into the throat; sticking pain running into the ear when swallowing. Tickling, harassing cough, dry or with raising of mucus. Chronic venous congestion of the mucous membrane of pharynx and larynx.—**HYDRASTIS.** Of especial value when the posterior nares are involved, with sticky, tenacious whitish or *yellow* mucus hanging from the naso-pharynx, with, often, much rawness of the parts. Or dry, glazed, sometimes fissured, condition of the mucous membrane, with expulsion of tough greenish mucus. Elevations on the mucous membrane. Ulcerations.—**IODUM.** Swelling and elongation of uvula; scraping and burning in the throat, extending into the oesophagus; ulceration in the throat, with swelling of the cervical glands.—**KALI BICHROMICUM.** Pharynx glossy, dull-red, coppery; pharynx dry, irritable; the arches of the palate especially are involved; hard cough, kept up for a long time, with expectoration of tough, stringy, sticky mucus which is dislodged after much difficulty; when coughing, solid little lumps of mucus are suddenly and with much force expelled from the mouth. Shooting pain from the tonsil into the ear. After eating solids, a sensation as though crumbs of food had remained in the throat, causing irritation. Worse in the morning.—**KALI IODATUM.** Coryza, with sneezing, lachrymation, and watery, acrid nasal discharge. Burning, scraping roughness in the

throat; dryness and itching in the throat; greenish, stringy, salty expectoration.—**KALI MURIATICUM**. The throat is pale and anæmic and the mucous membrane thickened. Thick, tough, white mucus in the throat and from posterior nares, difficult to dislodge; crusts in the vault of the pharynx. Granular pharyngitis. Adenoid vegetations.—**LACHESIS**. Not so often indicated here as in other throat affections, but occasionally rendering excellent service, especially in acute and subacute cases, when the constitutional symptoms completely overshadow the local affection. There is great lassitude, headache and general indisposition; the throat feels constricted; sensation of a plug in the throat; constant desire to swallow, with difficult and painful deglutition and pain extending into the (left) ear. Hawking of tenacious mucus. Throat livid, dusky red, puffed, dry.—**LYCOPodium**. In chronic cases, with derangement of the gastro-intestinal mucous membrane; the fauces appear brownish-red; dryness and sense of contraction in the pharynx, with hawking of hard, greenish-yellow phlegm. Worse on the right side.—**MAGNESIA PHOSPHORICA**. "Hypertrophy of pharyngeal structures; choking after deglutition; spasmodic cough."—**MERCURIUS BINIODAT**. In cases where there is much inflammatory action, even though its history be chronic. Throat feels sore and scalded, particularly early in the morning on first waking and during (empty) swallowing; the parts look "angry" or dark-red; there is induration of tonsils, elongation of uvula, and some swelling of the cervical glands. Hoarseness and huskiness of the voice, even to aphonia. Hawking of tough, white mucus or of greenish lumps; the naso-pharynx is covered with tough white or greenish mucus. Presence of cheesy masses in the throat. Ptyalism; fetor of breath.—**MERCURIUS PROTOIODAT**. More marked involvement of glandular structure; base of tongue covered with thick, dirty, yellow coating. Right side.—**NATRUM MURIATICUM**. Throat dry, glazed and smarting, although there is constant hacking of thin transparent mucus. Elongation of the uvula. Hoarseness. After the topical use of nitrate of silver. Tobacco-smokers' sore throat.—**NUX VOMICA**. Very useful in essentially chronic cases with derangement of the gastro-intestinal mucous membrane. Dryness, rawness and smarting in the throat; scraping in the throat, especially in the morning; he is

constantly making efforts to clear it. Loose cough, with thick grayish expectoration and sensitiveness to pressure in the suprasternal notch. Catarrhal headaches.—PHOSPHORUS. To be carefully considered when laryngeal and pulmonary (tubercular) symptoms are present. The throat is dry and glistens; there is rawness and scraping; hawking of lumps of white, transparent mucus. Hoarseness; aphonia when he talks long.—PHYTO-LACCA. In the acute form, with glandular involvement; dryness, roughness and smarting in the throat; swelling of soft palate and tonsils; tenacious, thick saliva in the throat; dark bluish redness or ulceration of the mucous membrane, with copious flow of tough, ropy saliva. Pain in the ear when swallowing, as though caused by difficulty of swallowing from great dryness in the throat.—PLUMBUM. Inflammation extends from right to left. Tonsils covered with small abscesses. Spasmodic contraction of the fauces. Angina granulosa.—PULSATILLA. In the acute form. Bluish redness of pharynx, tonsils and uvula, with swelling of the parts; sensation of a lump in the throat; cough, which may be dry or followed by copious expectoration and dyspnoea. More often indicated by its characteristic constitutional symptoms, as: burning fever without thirst, chilliness, amelioration in the open air.—RHUS TOXICODENDRON. Hoarseness from overexerting the voice, growing less as he continues talking; the throat feels sore and stiff; roughness and soreness in the larynx. Dryness of the mouth, not relieved by drinking. Sticking pains when swallowing.—SANGUINARIA. Throat feels exceedingly dry and burning, not better from drinking; redness of the throat; ulcerated sore throat. Coryza, with frontal headache, heat in the head, great dryness of the throat, and hard painful paroxysms of coughing without expectoration.—SANGUINARIA NITR. "My sheet anchor in chronic follicular pharyngitis; the remedy to use in the absence of clear indications for another (Ivins)."—SULPHUR. Great dryness and burning in the throat, first right side, then left, with elongation of the uvula. Study chiefly the constitutional symptoms.—WYETHIA. A comparatively new remedy which has proved of value in the chronic forms with pricking, dry burning sensation in the posterior nares and throat, and with a tendency to atrophy of the pharyngeal mucosa. The appearance of the throat is dark red; there is considerable sensitiveness,

with frequent desire to swallow, to relieve the dryness; swallowing is often difficult; much hawking and scraping.

ULCERATION OF THE PHARYNX.

Ulceration of the pharynx is of common occurrence and, as a symptom, varies greatly in severity and importance in proportion to the constitutional disease of which it often is a local expression. In the *follicular* form the ulcers are insignificant as to size and depth, and disappear with the removal of the chronic catarrh of which they usually are an accompaniment. It is only in very exceptional cases that they require special attention. The ulcerations which are seen in *eruptive fevers*, as variola, or in *typhoid* fever, are either the result of the general systemic infection or of existing cachexia. By their occasional severity they add much to the discomfort of the patient. If of cachectic origin, their appearance enhances the gravity of the prognosis. Cleanliness and the use of bland, soothing applications are important features of their management. In the great majority of cases, however, they furnish additional indications for the exhibition of remedies which have been discussed under appropriate headings, as: ARSENICUM, MERCURY, LACHESIS, the MINERAL ACIDS, etc. The character of *diphtheritic* ulcerations has been considered; a tendency to ulceration of the pharynx is peculiar to all pseudo-membranous affections. *Cancerous* ulceration occurs during the ulcerative period of cancerous growths, and usually is very painful. Relief may be afforded by the use of soothing, disinfecting washes and sprays. The ulcers of *lupus* may be superficial or perforating, with hard, everted edges and excavated base; they frequently are of considerable depth, surrounded by a slight areola, healing slowly and leaving behind contractions of cicatricial tissue, with much sensitiveness. Curettement or the galvano-cautery are employed for the removal of diseased tissue, followed by the free use of a fifty per cent. solution of lactic acid. *Tuberculous* ulceration is usually secondary, irregular, with ill-defined edges and grayish-yellow base. "It may show itself in grayish, shallow lenticular ulcerations or granulations distributed over the pharynx, faucial region, or palate; or in a deposit of miliary tubercles, which may degenerate, if the patient survive so

long." (Ivins.) The ulcers appear oftener in the later stages of the disease, develop slowly, are very painful, and at their base are covered with sticky, yellowish debris; the parts seem worm-eaten; deglutition is painful, sometimes almost impossible from the pain caused by it. Local treatment consists of cleansing and dusting the parts with powdered iodol or boric acid, or "spraying with a forty per cent. solution of lactic acid, a fifteen per cent. solution of peroxide of hydrogen, a twenty per cent. solution of calendula, or a ten per cent. solution of resorcin or menthol." (Ivins.) Of these, peroxide of hydrogen is most useful. Spraying with a two per cent. solution of hydrochlorate of cocaine, some ten or fifteen minutes before a meal, may enable the patient to eat with some comfort, and thus is of great practical value. Starch, containing a minute quantity of morphia ($\frac{1}{16}$ to $\frac{1}{12}$ of a grain), insufflated, may serve the same purpose when cocaine has failed. Curettement is advised by some authorities. *Syphilitic* ulceration in the secondary form occurs as erosions, in connection with mucous patches, grayish-white, superficial, and shallow; in the tertiary form it is the result of erosion and destruction of the gummata, and here the ulcers are deep, with smooth or ragged edges, surrounded by a bright zone; the surface, after healing, looks whitish and glazed, with a white, distorted cicatrix. Extensive œdema of the pharynx may be present and the destruction of tissue be great. In addition to the specific constitutional treatment, oftenest the exhibition of potassium iodide or mercury, the local use of a weak solution of potassium permanganate or of boric acid is advisable, chiefly to cleanse the parts. Iodoform, insufflated, though objectionable to many patients, often acts well; iodol or boric acid are less unpleasant. Ivins speaks highly of the following application: metallic iodine, grs. 15; alcohol, q. s.; glycerine, $\bar{3}$ i, to be used two or three times daily, the parts having been thoroughly cleansed with the spray, gargle, or post-nasal syringe.

HERPETIC PHARYNGITIS.

Also known as membranous, diphtheritic or aphthous sore throat. An affection of the throat corresponding to herpes of the skin. It is characterized by the appearance of blisters upon the pharyngeal mucous membrane, in due course of time fol-

lowed by a fibrinous exudation closely resembling the diphtheritic membrane. It occurs at any period of life and at any season of the year, but is oftener seen in young children and during the autumn and early spring. It is said to be infrequent in England; some American writers make a similar claim for this country, but the larger number of observers recognize it as common in America. It is often seen during epidemics of diphtheria, as well as in connection with advanced cases of syphilis and phthisis.

Symptoms.—Weariness, general indisposition and loss of appetite, continuing for a few days, are followed by a sense of coldness or a chill, which soon gives way to high fever, with a temperature of 100° to 103° and a pulse-beat of from 100 to 140 per minute, accompanied by frontal or supraorbital headache, sometimes nausea and slight vomiting, and almost always aching in the back and legs. The tongue is badly coated and the breath offensive; the throat becomes sore, dry and hot, sometimes extending into the nares and larynx, with much difficulty of swallowing and accumulation of thick tenacious mucus or copious salivation.

Examination of the throat in the early stage shows the mucous membrane red, swollen, and covered with a fine eruption of vesicles, about as large as a millet-seed, whitish, and usually occurring singly or in groups, but confluent in bad cases. Each vesicle is surrounded by a zone of inflammation, and on its summit presents a dark spot. These vesicles may be reabsorbed or burst. If the latter, a small, circular, superficial ulcer forms, which may heal spontaneously or, if not, will in a few hours be covered by a whitish or yellowish-white fibrinous deposit, which, coalescing with others, soon forms patches of pseudo-membrane which closely resemble diphtheria. In a few days the ulcers heal, and the loosened membrane is thrown off. The tonsils, pillars of the fauces and the soft palate are the parts usually affected. A considerable degree of œdema may be present. Deafness from involvement of the Eustachian tubes, and hoarseness and cough from extension into the larynx, are not infrequent. Throughout the attack prostration is a marked feature.

The *course* of the disease in the average case is toward a rapid recovery, the intensity of the symptoms, in a majority of

cases, abating within forty-eight hours. Complete recovery in these takes place in a week to ten days. But when there is a pronounced scrofulous diathesis or a cachectic condition, a series of relapses may indefinitely delay recovery and prove serious from their very tediousness. When the affection occurs during an epidemic of diphtheria, its course must be closely watched, partly because it may assume all the dangerous characteristics of this more serious disease, and partly because a clear differentiation between the two is not always possible. Gangrene of the throat is an infrequent, but dreaded, complication.

The differential diagnosis from diphtheria presents many difficulties and is not always possible. If seen early, the herpetic character of the eruption is almost decisive, especially so since herpetic pharyngitis is practically limited to the tonsils, pillars of the fauces, and soft palate; the rapid improvement of the constitutional symptoms under appropriate treatment also tends to establish a diagnosis of herpetic pharyngitis. If the early stage has passed when the physician is called in, and the constitutional symptoms are pronounced, with great prostration, and the case stubbornly drags along, as it may do in scrawny, debilitated and scrofulous children, a clear diagnosis cannot easily be made, and, as stated, may become impossible.

Treatment.—If the patient is seen during the early stage, ACONITE or GELSEMIUM are likely to be indicated, the former by its restlessness, quick and hard pulse, and great bodily heat; the latter, by its aching in back and limbs, headache, more moderate fever, often preceded by slight shivering, watery discharge from nose and eyes, with dryness, swelling and redness of the fauces.—BELLADONNA has more marked symptoms of general and local congestion. The throat is bright red, very dry, and swallowing is exceedingly painful. The right side usually is first affected or is worse than the left. The speech is nasal, as in tonsillitis. The cervical glands are swollen and hard, and there is stiffness of the neck.—APIS is of great benefit when the onset of the disease has been insidious and not characterized by much local or general congestion, the *œdematous* tendency constituting the most striking feature of the case, and giving rise to much difficulty of breathing and swallowing, drink or liquid food often returning through the nose. The

throat looks puffed and as though varnished, and is studded with blisters and membranous patches. Stitching pain in the throat, between the acts of swallowing. "Rose-colored, red rash upon the skin."—*ARGENTUM NITRICUM* has painful dryness in the throat, with sense of constriction, ulceration in the throat, and pain as though a splinter were sticking into it; thick, tough mucus in the throat.—*KALI BICHROMICUM* is recommended when there is an accumulation of stringy, tenacious mucus in the throat; stitching pains in the ears during deglutition; smarting, raw feeling in the posterior nares; tendency of the exudation to extend into the air-passages; violent supraorbital headache.—*CAPSICUM* has burning soreness in the throat, with ulceration on the fauces; white spots on the throat; dry, convulsive and painful cough; feeling of fulness in the uvula and sense of "contraction in the curtain of the palate during deglutition." Great thirst for cold water, with sensitiveness to cold in any form; even a drink of cold water, though craved, makes the child shudder.—*MERCURIUS IODATUS* is often indicated. Both iodides of mercury are important remedies here. The inflammation is severe; the throat very painful (burning, lancinating pain), often rendering swallowing impossible. The tonsils are intensely inflamed and studded with ulcerations; there is usually considerable involvement of the glands of the neck and the patient is annoyed by the presence of tough, stringy mucus in the throat. The *YELLOW IODIDE* is preferable when the base of the tongue is coated with a triangular, thick yellow coating; the breath is very fetid; loose, rattling laryngeal or bronchial cough; preference for the right side. The *RED IODIDE* is said to have a preference for the left side of the throat, and has greater intensity of the ulcerative process, with correspondingly severe pain.

If the symptoms of the case resemble those of diphtheria, *BAPTISIA*, *LACHESIS*, *ARSENIC*, *CROTALUS*, and other remedies given under diphtheria, must be consulted. If relapses are frequent, *CALCAREA CARBONICA* and the antipsorics must be carefully studied.

The use of gargles and mouth-washes is not only annoying to the patient, but accomplishes little, if any, good. If for some reason they are desirable, weak solutions of hydrastis or of some of the potash-preparations, as the permanganate, are

preferable. Nourishment will necessarily be given in liquid form, and in serious cases must be made the subject of special care and attention.

PHLEGMONOUS PHARYNGITIS.

Also called peritonsillitis or peritonsillar abscess. A dangerous affection of the throat, of bacterial origin, involving the mucous membrane and the submucous and peritonsillar tissues. It may result from cold, especially in persons who are weak or cachectic, or appear in connection with other infectious diseases (as typhoid fever, measles), or it may follow an injury to the parts (use of the cautery, a scald, an operation). The tendency is to rapid and extensive ulceration.

Symptoms.—The onset of the disease is violent. A severe headache, sudden in its appearance, and accompanied with a sense of marked indisposition, is followed by a hard chill, high fever, with quick hard pulse and a temperature of 103° , or more, severe aching in the back of the neck, back and limbs, and not infrequently, especially in children, delirium. Pain and soreness in the throat promptly declare themselves, with sense of obstruction in the throat and painful swallowing. The local symptoms are intense and grow worse rapidly. At first there is much dryness in the throat; this, however, yields to an accumulation of offensive, tough, stringy mucus, soon becoming muco-purulent. The pain in the throat is intense. The parts are so badly swollen that the most painful efforts at deglutition prove useless. Food is regurgitated and breathing becomes seriously embarrassed, especially during sleep. The tongue is coated and the breath very offensive. The voice is distinctly nasal. Earache is frequent and persistent. Painful swelling of the glands of the neck is often present, and the inflammatory action may be sufficiently severe to extend to and involve the articulation of the jaw, rendering it impossible for the patient to open or completely close the mouth. The suffering caused by the pain; the inability to take nourishment and to breathe freely; the restlessness and sleeplessness at night—all these combine to render the condition of the patient one of absolute wretchedness and to produce an extreme degree of exhaustion.

The throat, upon examination, presents a dark purplish hue

and a condition of extensive œdema, at times practically fixing the soft palate and obliterating the fauces. The swelling may completely fill the naso-pharynx or extend into the larynx, in the latter case giving rise to dyspnœa which is at times sufficiently severe to demand operative interference. Submucous hæmorrhage is not infrequent. The tonsils, though swollen, are not deeply involved.

Reabsorption of the infiltration may take place, and with it a gradual recovery. In the larger number of cases pus forms, with an accompanying aggravation of symptoms until evacuation of the abscess occurs from spontaneous rupture or incision. The former more often takes place in the anterior palatine arch, and is usually brought about by some exertion of the affected parts, as coughing or attempts to swallow. Immediate relief of local and constitutional symptoms follows the evacuation of pus.

The duration of the disease is from four to fourteen days, unless both sides of the pharynx, one after the other, become involved, or relapses occur, or burrowing of pus has taken place in the deep cellular tissue of the throat, external neck, œsophagus or mediastinum, in which case recovery will be indefinitely prolonged or jeopardized. Among the possible complications, ulcerative erosion of the great blood-vessels and general blood-poisoning are the most serious.

Treatment.—The first and chief aim must be to bring about resolution by reabsorption of the infiltration, and for that purpose applications of ice and ice-cold water have been recommended, without, however, yielding satisfactory results. It is better practice to hasten suppuration by the use of moist heat (hot fomentations around the neck, hot gargles, hot inhalations) and then insure prompt evacuation of the abscess. For the latter purpose a bistoury of which all but half an inch, or so, of the blade has been protected by a wrapping of adhesive plaster or tissue-paper may be used if a pharyngeal knife is not at hand. The tongue of the patient is controlled by a depressor, and the operation performed by inserting the knife flat, the cutting edge toward the median line, enlarging the cut toward the median line before withdrawing the knife. By this means the incision will be made large enough to insure the escape of all the contents of the abscess, and there is slight danger of

wounding important vessels. If it is difficult to detect fluctuation, the method first suggested by Stoerk may be employed. "Put the fingers of one hand externally under the angle of the lower jaw, pressing the skin and all the tissues inwardly, while the index finger of the other hand moves slowly over the infiltrated parts, beginning high up on the soft palate and sliding downward toward the tongue. When the two index fingers moving and pressing toward each other meet in a spot where the tissues offer less resistance, imparting a doughy sensation, this is the point for the incision."

The pain frequently is so intense that most earnest appeals for temporary relief are made. Morphine is objectionable. If the attending physician deems it best to use a narcotic, salol may be given in doses of ten to fifteen grains every three hours; children can take this drug in doses of from two to ten grains. Antipyrine and phenacetine have also been used, sometimes in combination with salol.

Occasionally, pus-formation progressing slowly, and the patient's condition being serious, suppuration may be hastened and some temporary relief given by making a number of free incisions; this procedure is not free from danger since sloughing may result. In extreme cases tonsillotomy or tracheotomy may have to be performed for the relief of dangerous dyspnoea.

Therapeutics.—**ACONITE** is undoubtedly of value if the patient is seen early.—**BELLADONNA**, indicated by its characteristics, follows **ACONITE**.—**CANTHARIDES** should be carefully studied because of the intensity of its action upon the pharyngeal mucous membrane. The throat feels on fire; constriction amounting almost to suffocative dyspnoea.—**ALANTHUS**. Great swelling of the throat, internally and externally. Throat dusky-red. Ichorous discharge. Delirium. Stupor and indifference. Coldness of the tip of the nose and extremities.—**APIS** is suggested by extensive œdema of the parts, and is valuable when there is stupor and great prostration. Severe stinging pains when attempting to swallow.—**MERCURY** is of importance, and the iodides of mercury, given at short intervals, have done excellent service.—**MERCURIUS CORROSIVUS** has intense inflammation and ulceration of the throat, with violent burning pain, extensive swelling threatening suffocation, and general phlegmonous tendency.—The usefulness of **SILICA**, **AR-**

SENIC and HEPAR SULPH. depends upon their influence upon the suppurative process.—RHUS, ARSENIC, BAPTISIA, CARBO VEGETABILIS, and others of this class, come into play when the patient is in a condition of extreme prostration, with a generally depraved, cachectic state of the system.

ACUTE INFECTIOUS PHLEGMONOUS PHARYNGITIS.

A very grave affection which was first described by Senator, in 1888. Its pathology consists of "diffuse purulent infiltration of the deeper parts of the pharyngeal mucosa, continuing from there to the larynx, trachea, and secondarily to other parts of the body, *e. g.* the mucosa of the stomach. The lymphatic glands of the neck are swollen, and the kidneys are sometimes enlarged, as is also the spleen. No specific micro-organisms could be cultivated from the affected organs."

The disease attacks persons who are in the enjoyment of robust health. There is soreness of the throat, difficulty of swallowing, hoarseness and loss of voice, extensive œdema of the parts, with dyspnœa. Fever is present through the entire course of the disease, observers differing as to its intensity and the range of temperature attained. The constitutional symptoms are very severe from the beginning, and suppuration takes place rapidly, *but is not localized*. A typhoid state supervenes in some cases, occasionally followed by coma. "The urine always contains albumin. Death, as a rule, ensues suddenly, within a few days after the beginning of the disease."

The prognosis is entirely unfavorable. So far, treatment has proved useless or of temporary benefit only.

ERYSIPELATOUS PHARYNGITIS.

An infectious disease, not differing essentially from erysipelas in any other part of the body, and in the larynx confined to the superficial structures. It may occur primarily or from extension or metastasis from some other part of the body. Resolution is not infrequent, but extension of the erysipelatous processes to the face, nasal cavity, middle ear, bronchi or lungs may take place and give rise to the most serious complications.

The symptoms are those of an intense acute catarrhal phar-

ngitis, sudden in onset or preceded by several days of general indisposition, high fever, etc. There is intense heat, dryness and severe pain in the throat, with hyperæmia, glazed redness, swelling, sometimes œdema, of the parts; blisters, filled with serum or pus, may be seen. Salivation is common. The glands of the neck are moderately swollen. The constitutional symptoms are marked, with a temperature of 102° to 104° , quick hard pulse, rapid breathing and prostration. Recovery is followed by desquamation of the affected mucous membrane.

The gravity of the process depends not only upon the impairment of nutrition which is a feature here as of other pharyngeal inflammations, but upon the existing œdema, resulting in great embarrassment of respiration, and upon the loss of tissue, hæmorrhage, and septicæmia which are the result of sloughing of the parts.

Treatment.—Close attention to cleanliness and disinfection of the pharynx (peroxide of hydrogen, permanganate of potash, alkaline sprays generally) are very important. Spraying with menthol or cocaine is soothing and often directly helpful. Lumps of ice may be sucked freely and stimulants used as indicated. Œdema of the larynx may demand the hypodermatic use of pilocarpine hydrochlorate (gr. $\frac{1}{6}$ to $\frac{1}{8}$), scarification, or even tracheotomy. Proper medication is all-important, since the remedies capable of controlling erysipelatos inflammation in other parts of the body cannot but yield good results when the same process invades the pharynx. Hence, such remedies as APIS, BELLADONNA, CANTHARIDES, RHUS TOXICODENDRON, and others indicated by the local and constitutional symptoms, must be administered judiciously and with perseverance.

GANGRENOUS PHARYNGITIS.

Gangrenous or putrid sore throat is a rare and very serious affection. It may be primary, but much oftener follows scarlet fever, measles, diphtheria, small-pox, typhoid fever and phlegmonous pharyngitis, or occurs as the result of traumatism. It is an intense inflammation with marked gangrenous tendency, affecting chiefly the soft palate, tonsils and posterior walls of the pharynx, eventually extending downward, causing disastrous laryngeal and pulmonary complications, and infecting

the stomach and intestines from swallowing particles of foul, gangrenous matter.

The symptoms are those of a pharyngitis, usually violent in their onset and character, with the formation, in a few days, of dark, blackish, gangrenous spots on the affected parts; the gangrenous patches are surrounded by highly inflamed, livid, mucous tissues, the affected parts emitting a characteristic horribly foul odor which somewhat resembles that of fæcal matter. The fever at first is high; later the temperature drops and eventually becomes subnormal. The entire system is soon affected; prostration grows excessive, the extremities grow cold, symptoms of collapse supervene, and death occurs, generally from syncope. Exceptionally recovery takes place.

The diagnosis from diphtheria rests upon the greater prostration of gangrene, the characteristic odor, the blackish appearance of the tissues, comparatively slight involvement of the cervical glands, and the low temperature and pulse.

Treatment.—*AILANTHUS*, *ARSENIC*, *MERC. CORROSIVUS*, *AMMON. CARB.*, *BAPTISIA*, *SECALE CORNUT.*, *CARBO VEGETAB.*, *KREASOTUM*, *LACHESIS*. Locally, soothing and disinfecting solutions must be used in the form of a spray or gargle; of these, peroxide of hydrogen and potass. permanganate are the most useful. Stimulants are indicated, and painstaking attention to feeding, by mouth and rectum, is indispensable.

RETRO-PHARYNGEAL ABSCESS.

An affection chiefly of early childhood, though occasionally seen in adults, consisting of deep-seated inflammation of the posterior pharyngeal wall, resulting in the formation of pus. It is most frequent in delicate, scrofulous and tuberculous subjects. In the great majority of cases it is of idiopathic origin, the result of cold, especially from subjection to the heat of a very warm room after exposure to severe cold. It also occurs as a sequel of fevers, particularly of scarlet fever and diphtheria, and as a secondary affection in caries of the cervical vertebræ.

In the common idiopathic form the onset of the disease is usually insidious, the patient suffering from general indisposition, loss of appetite, restlessness and slight fever. Within a few days attention is called to the throat by the nasal, metallic

sound of the voice and evidence of fulness and some soreness in the throat, in due time accompanied with difficult, painful swallowing, which increases as the local symptoms become more and more marked. In severe cases there is interference with breathing, differing in degree with the severity of existing tumefaction and the exact location of the swelling.

The swelling in the larger number of cases is visible and readily detected by the touch. It is usually on one side of the median line, though occasionally concealed behind the posterior nares or œsophagus, differing as to extent from an insignificant tumor to a general tumefaction often occluding the entire cavity of the pharynx. The overlying mucous membrane may present slight indication of severe inflammation; when the inflammatory action partakes of a phlegmonous character, the tissues are congested, hot and dry; patches of yellow show where pus has formed.

A dry, painful cough may be present; external swelling of the throat is not infrequent, and chills or shivering accompany the formation of pus.

Difficulty of breathing depends largely upon the site of the abscess; thus, if located behind the posterior nares, dyspnœa is slight, but swallowing very difficult.

When secondary, the symptoms are those of the primary affection.

The duration of the disease is variable. The average case terminates in from one to two weeks. Others run a tedious course, especially so when the abscess is not large, is deep, and pus has burrowed, causing slight local symptoms, but giving rise to grave constitutional disturbances. Exceptionally a fatal termination may take place in a few days.

Diagnosis.—The tumor can almost always be readily seen or felt. When it is located behind the posterior nares, the rhinoscope or laryngoscope may have to be employed. The symptoms at times resemble those of *membranous croup*, but the great difficulty of swallowing, the relief of dyspnœa usually afforded by sitting up, and the absence of hoarse shrillness of breathing and voice establish the diagnosis. The gradual development of labored breathing and the absence of respiratory embarrassment, especially accentuated during inspiration, distinguish it from *œdema of the larynx*; these conditions may co-exist.

Treatment.—In the early stage such remedies as ACONITE, BELLADONNA, APIS, LACHESIS and MERCURY may be exhibited, according to the symptoms of the case. Usually the patient is not seen until pus has formed, and then HEPAR SULPH., SILICA and ARSENIC are indicated. LACHESIS and RHUS TOXICOD. are valuable when a phlegmonous or erysipelatous condition obtains.

Prompt evacuation of pus must be secured. A slight incision is at times sufficient. If the pus lies deep, considerable care must be used not to injure important blood-vessels. The patient's head must be promptly thrown forward upon the completion of the incision to insure the escape of the contents of the abscess through the mouth. It is evident that neglect to open the abscess in time may lead to burrowing of pus and serious complications, such as involvement of the cervical vertebræ or auto-infection. In tedious or bad cases close attention must be paid to proper feeding, to sustain the strength of the patient.

ANGINA LUDOVICI.

Ludwig's angina, or cellulitis of the neck, may occur idiosyncratically, or from trauma, or secondarily in connection with acute infectious fevers, especially diphtheria and scarlet fever. Its first expression usually is a pronounced swelling of the submaxillary glands of one side. Other glands are involved later. Its chief and great danger lies in systemic infection; hence, prompt and radical treatment is demanded, usually free incision in the buccal region. Matignon reports successful treatment of four cases by incision in the subhyoid region. "Felix Semon holds that the various acute septic inflammations of the throat—acute œdema of the larynx, phlegmon of the pharynx and larynx, and angina Ludovici—represent degrees, varying in virulence, of one and the same process."

DISEASES OF THE TONSILS.

ACUTE TONSILLITIS.

Acute tonsillitis, acute amygdalitis, angina tonsillaris, cynanche tonsillaris, quinsy, is an acute inflammation of one or both tonsils, superficial or deep, terminating in resolution, abscess, or chronic enlargement of the gland.

Ætiology.—It is more frequently seen in young adults of twenty to thirty years of age, though observed among both younger and older persons. It is, however, uncommon in children of less than ten and in adults of more than forty-five years of age, except as there may exist a special predisposition to the affection. A strumous diathesis and inherited predisposition are important ætiological factors, and in their presence trifling causes may excite an attack. Men, on account of greater exposure, furnish the larger number of cases. In damp and cold weather, such as favors the appearance of rheumatism, and in countries where severe and sudden changes of weather are the rule, acute tonsillitis is quite common; the absence of these conditions, as in Southern California, renders tonsillitis a comparatively rare disease and usually protects persons who in the Eastern states suffer from frequent attacks. The fact that ætiologically tonsillitis and rheumatism are closely related has always attracted the attention of the profession. It is doubtful if this relation is more than ætiological, although it is well-known that rheumatic symptoms often precede an attack of quinsy, promptly disappearing as soon as the throat becomes sore; on the other hand, tonsillitis may precede an attack of rheumatism, and both may occur together.

Among the exciting causes sudden chilling and taking cold are prominent. Scarlet fever, measles, small-pox and diphtheria are occasionally followed by tonsillitis. In some cases, especially in scrofulous, strumous subjects, it is brought on by slight traumatism, as a foreign body (fish-bone) penetrating into the gland, or by some local irritation, as from the inhalation of irritating gases. The inhalation of sewer-gas and the

use of bad water may cause a tonsillitis which usually involves both tonsils, and probably is septic in character.

The superficial form is oftener seen in children; parenchymatous tonsillitis is largely confined to adults.

Symptoms.—In the main, the symptoms of the superficial form differ from parenchymatous tonsillitis in their comparative lightness, shorter duration, and their usual termination by resolution. Bearing this in mind, it is not necessary to describe these forms separately.

A short period of indisposition, rarely exceeding twenty-four hours, is followed by high fever, with a temperature which may reach 104° or 105° on the evening of the first day. Fulness, stiffness, heat, soreness and pain in the throat, with frequent empty swallowing, appear and increase rapidly. Examination of the throat discloses an enlarged tonsil, of vivid bright-red color; the lacunæ are filled with a viscid, yellowish-white secretion; this extends into the Eustachian tubes and inner ear, causing severe and stubborn earache and temporary deafness.

Swallowing is very painful, the difficulty of deglutition increasing in proportion to the extent of tissues involved and of the swelling of the parts, which constantly lessens the calibre of the faucial orifice and eventually compels the return of liquids through the nose. The condition of the patient under these circumstances is distressing. The pain in the throat is excessive. There is copious secretion of saliva and mucus, which cannot be swallowed, and yet constantly excites the desire to get rid of it. The saliva is finally allowed to dribble from the mouth, but the ropy, tenacious secretions keep up a constant involuntary hawking and painful gagging; to take a drink not only involves aggravation of already severe pain and its probable return through the nose, but danger of its entering the larynx, giving rise to paroxysms of violent coughing and choking, causing intense distress. The earache in the meantime continues; smell and taste are almost lost; the voice is thick and guttural; every attempt to speak is expressive of the dread of pain which is sure to result from each effort involving the use of the inflamed throat, aggravated from the fact that by this time the connective tissue of the throat and the glands at the maxillary articulation are involved, adding to the difficulty of swallowing or talking. The glands of the neck also

are enlarged and sensitive to the touch, and the neck itself is often stiff and painful. The urine is high-colored, scanty, of high specific gravity; and there is headache and soreness and aching in the back and legs. The face bears an expression of intense suffering, appears drawn and haggard, and is almost characteristic of the disease. Great bodily exhaustion results from the severe suffering.

In the simple variety of tonsillitis the symptoms resulting from involvement of the deeper tissues and adjacent structures may be wanting, but even in these the pain is very severe and the general picture of the disease much as described. Improvement, however, shows itself in these within five or six days, and resolution takes place possibly sooner. When the parenchyma is involved the case is more tedious, although even here resolution may take place. However, if in the latter form decided improvement does not occur within a week or ten days, suppuration may be expected. In such a case rigor, usually slight, is noted; the pain continues and even increases, but in character becomes lancinating, pulsating, throbbing. The abscess finally bursts, with immediate relief of all the symptoms.

Spontaneous evacuation of the abscess is usually into the mouth or pharynx. It may empty into the larynx and cause serious, even fatal, strangulation; or the pus may burrow and either make its exit at the angle of the jaw or extend downward and through the connective tissue, finding its way into the mediastinum or lungs, with, of course, very serious consequences.

In many cases of parenchymatous or suppurative tonsillitis the course of the disease is much more rapid, and fluctuation may be felt in three or four days by placing one finger on the tonsil and the other at the angle of the jaw.

Diagnosis.—The symptoms of tonsillitis usually are so pronounced that the disease is readily recognized. The pinched appearance of the face alone is almost sufficient to establish the diagnosis. It is, however, often necessary to exercise care in a differentiation between acute tonsillitis and *diphtheria*. In tonsillitis the secretion is sticky and occurs in "patches;" these patches are separated by clean, inflamed tonsillar tissue; the deposit itself is on the tonsils; it can be wiped off; there is no erosion of the mucous membrane underlying it. In *diphtheria* the

membrane is not limited to the tonsils, but covers the uvula and soft palate as well; the membrane is uniformly distributed and is of an ashy-gray color; it cannot be wiped off; when removed by force it comes off in flakes or strips, exposing underneath a raw, bleeding and ulcerating surface. The angina of *scarlatina* is easily distinguished by the presence and character of the constitutional symptoms of scarlet fever, the acuteness and duration of the fever itself, the flushed face, the "strawberry" appearance of the tongue, and the uniformity with which both tonsils are involved.

Prognosis.—In the uncomplicated case an unqualified favorable prognosis can be given. Complications, however, are not rare, even in the simpler forms (variously divided into follicular, lacunar, catarrhal, herpetic, ulcero-membranous) of tonsillitis.

Febrile albuminuria, endocarditis and pericarditis occasionally set in, and affections of the middle ear are common. In the suppurative form danger more often arises from the burrowing of pus or from strangulation caused by the bursting of the abscess, the contents of which are emptied into the larynx, or from extreme dyspnoea due to extensive laryngeal oedema, from hæmorrhage and, very rarely, from gangrene.

Exceptionally the course of the disease is rendered very tedious by the recurrence of the inflammatory process on the other tonsil, or in strumous subjects by suppuration of some of the cervical glands. In such cases prostration becomes a serious factor. In nearly all cases more or less hypertrophy of the tonsils remains; this applies especially to those of a strumous habit.

Treatment.—Cold applications to the neck (packs of flannel dipped in ice-cold water, covered with oiled silk, or small ice-bags) are recommended in the early stage. Lumps of ice, allowed to dissolve in the mouth, are both grateful and helpful. Osler advises the use of dry sodium bicarbonate every hour, applied directly to the inflamed tonsil by means of the finger dipped into the powder.

Suppuration threatening, hot applications are indicated, such as flannels wrung out of hot water or hot infusion of the flowers of hops, covered with oiled silk. The use of medicated vapors (compound tincture of benzoin, permanganate of

potash) is soothing and directly beneficial. Deep scarification of the tonsil is advised in bad cases with excessive swelling, because it relieves pain and hastens suppuration. Early evacuation of the pus should be insured by making a free incision at the point of fluctuation with a properly wrapped bistoury, carrying the incision from above downward, parallel with the anterior pillar. The point of fluctuation, in the majority of cases, is at the upper and anterior surface of the tonsil, near the anterior palatine fold. Care must be taken not to wound the anterior arch of the palate. After the evacuation of the pus, peroxide of hydrogen or thymo-hydrastis should be used as a gargle until healing has taken place. Excision of the tonsil and even tracheotomy may become necessary if the swelling, in the antepurpurative stage, is so great as to threaten suffocation. If the patient desires drink, lemonade is usually more grateful than water and aids in "cutting" the phlegm. Especial pains must be had to support the system by nourishing diet. The application of cocaine to the inflamed parts, by means of a camel's-hair brush, often enables the patient to swallow when otherwise this would be impossible; the practice is objectionable on account of the dryness of the parts which is likely to follow the use of cocaine.

Therapeutics.—**ACONITE** is an excellent remedy in the early stage of the disease. Its action is so satisfactory that it has become a routine prescription with the physiological school.—**BELLADONNA**, beyond doubt, controls more cases, prior to the stage of suppuration, than all other remedies. Its indications are perfectly familiar to all. The lower attenuations have proved much more useful here than the high.—**MERCURIUS** is of the greatest value when there is severe inflammation of the gland-substance. It covers to perfection the symptoms of a large number of such cases, and the statement made by E. M. Hale (*Practice of Medicine*) that it frequently aborts quinsy is based upon facts. The **IODIDES** of **MERCURY** are more frequently called for, but in very severe cases the **MERCURIUS CORROSIVUS** or the **MERC. CYANAT.** may be used advantageously.

In addition the following must be consulted: **APIS**. Great œdema of the parts, with dyspnoea; difficulty of keeping anything about the throat, on account of the feeling of distress caused by it; dryness of the mouth and throat; stinging, burn-

ing pain in the throat; absence of thirst; albuminous urine.—**LACHESIS**. Great sensitiveness to touch or slight pressure about the neck; sharp pain in the throat, on the left side, extending into the ear; throat livid, purple; great difficulty in swallowing; fluids regurgitate through the nose; swelling of cervical and submaxillary glands. Great prostration.—**PHYTOLACCA**. Great rawness and roughness of the throat, especially on the right side, with backache, headache and muscular stiffness. Purplish appearance of the throat; pain at the root of the tongue, running into the ears, when swallowing. Abundant secretion of tough, stringy mucus in the mouth and throat. Urine dark, scanty, albuminous. Great weakness.—**RHUS TOXICODENDRON**. Throat swollen, vivid, covered with (yellow) membrane. The muscles of the throat are sore and stiff. Rheumatic lameness, aching and bruised soreness in the muscles. Sticking or stinging pain in the tonsils.—**GUAIAECUM**. Violent burning in the throat. Intense headache. Putrid taste in the mouth. The case tends toward rapid suppuration. In the early part of the disease.—**FERRUM PHOSPHORICUM**. Resembles **ACONITE** in its sphere of action, but lacks the intensity of the latter. Recommended by Fisher (Diseases of Children).—**KALI BICHROMICUM**. "Tonsillitis herpetica with membranous exudation, inflammation of uvula and pharynx, foul yellow tongue; fauces covered with ropy mucus; Eustachian tubes blocked up; pain shoots from ear down to the throat. (Lilienthal.) To be considered in cases which resemble diphtheria.

The stage of suppuration demands the exhibition of **HEPAR SULPH.** (sensitiveness to cold; stitches in the throat extending into the ears, sensation of fish-bone or splinter in the throat), **SILICA** (on the left side; pricking in the throat as from a pin), **SULPHUR** (abscess refuses to heal), and antipsorics generally.

CHRONIC TONSILLITIS.

Chronic tonsillitis, also described as chronic amygdalitis and hypertrophy of the tonsil, from the frequency of its occurrence and the serious and far-reaching character of the constitutional symptoms which accompany it, has received very painstaking attention at the hands of the profession. The belief is now generally entertained that a majority of the serious disturbances

noted in connection with hypertrophy of the tonsils are only in part due to the tonsillar enlargement, but depend upon a group of structural changes, chiefly in the nares and naso-pharynx, with which chronic tonsillitis is almost invariably associated, but which the enlarged tonsil alone—either by pressure upon adjacent structures, or by its acting as a means of obstruction, or by inability to perform its physiological function—cannot possibly cause. It is because of this now generally accepted opinion that recent writers show a tendency to discuss chronic tonsillitis in connection with the broader subject of “mouth-breathing.” But in all these cases enlargement of the tonsils exists, and requires attention.

Pathologically, the enlarged gland may be hard (fibrinous) or soft (adenoid). The adenoid form is the more frequent. It is usually seen in children, and is associated with adenoid vegetation in the naso-pharynx. It involves the mucous membrane of the follicles rather than the substance of the glands, and undergoes atrophy earlier and much more completely than does the fibrinous form. The tonsillary enlargement is usually well-marked, but becomes excessive only when the gland is acutely inflamed. Hard or fibrous hypertrophy commonly results from repeated attacks of tonsillar inflammation, and is slower than the adenoid form to cause pharyngeal disturbances.

Clinically, according to Chs. H. Knight, three forms may be recognized.

1) A very marked hypertrophy, accompanied with difficult deglutition and respiration. The cause of the latter, and also of the ear-troubles so frequently seen in this connection, is not due to the enlargement of the tonsil, but to adenoid growths in the nasal fauces and vault of the pharynx. Mouth-breathing here is a conspicuous and troublesome symptom.

2) A flat, diffuse hypertrophy, only slightly projecting into the fauces, but becoming prominent during the act of retching. This type occurs most frequently in persons of a rheumatic diathesis, and is characterized by a pronounced tendency to recurring inflammation with liability to suppuration, not within the body of the tonsils, but in the adjacent cellular tissues.

3) Enlarged tonsils, bound down by adhesions, the result of inflammation, of the anterior pillar. Here “the tonsil carries with it the palato-glossal fold, which may be much thicker

than normal or may be spread out over the surface of the tonsil in a thin veil of mucous membrane."

Release of the tonsil from the pillar results, according to Cohen, in diminution of its size.

The adenoid growths spring from the mucous membrane of the vault of the pharynx, are usually papillomatous, with lymphoid parenchyma, sessile or pedunculated, or of a moderate degree of firmness, reddish, freely supplied with blood-vessels, and as large as a pea, sometimes larger. Chronic nasal catarrh almost always exists when these growths are present.

Hypertrophy of the tonsils is a disease of childhood, rarely first appearing in adult life, and is probably a common expression of physical weakness and of a strumous diathesis. It is not infrequently observed in very young children, though probably never congenital. There is in a great majority of cases a history of previous inflammation, not necessarily of attacks of marked severity.

Symptoms.—The symptoms of chronic tonsillitis, using the term in the broad sense previously indicated, differ very much, ranging from slight and perhaps occasional local irritation with trifling constitutional disturbances to a condition which is justly alarming. The physician, of course, rarely deals with the lightest cases, since some appreciable deviation from health is sure to exist before he is consulted.

Mouth-breathing is one of the earliest and most constant symptoms present, and its effects are far-reaching. It is rarely due to any very great obstruction to breathing from the tonsillar enlargement alone, but depends upon the fulness of the pharynx which is immensely emphasized by the presence of chronic nasal catarrh and adenoid vegetations in the nasopharynx. That these latter are found in very many young children has been amply demonstrated in both Europe and America. Natural breathing being obstructed and growing tiresome, the child unconsciously seeks relief by breathing through the mouth. If well-marked in infants, it is usual and natural to find associated with it considerable difficulty of swallowing, nursing at the breast being particularly trying. A young babe, thus affected, will cough, snort and choke until it becomes exhausted; lack of food alone in such cases becomes a serious cause of trouble.

Mouth-breathing in young children is best studied at night, when asleep. The sleep is disturbed by evident uneasiness and vague consciousness of discomfort. The jaw drops; the respirations are irregular and hard, interrupted by a brief cessation of all respiratory effort, to be followed by a deep inspiration and momentary relief. The heart's action corresponds to the breathing; it slows as inspiratory effort is light, and increases as breathing is more active and regular. The effort constantly made finds an expression in the contraction of the *alæ nasi*. The child is restless, tumbles about in bed, and frequently suffers from what nurses aptly call night-terrors. Peculiar changes in the appearance of a child thus affected take place in due season. The face not only assumes an unintelligent expression from the habitual dropping of the jaw, but eventually the nostril becomes pinched in appearance, the lips thickened, and the expression of the countenance stupid and disagreeable. More than this, the intelligence of the little patient appears to wane; the child grows slow of comprehension, lacks in energy, moves listlessly, is sullen and morose. Proper treatment at this time, consisting chiefly of the removal of the adenoid growths, produces startling results for the better, often in a surprisingly short time. There is considerable cough in many of these cases, short and paroxysmal in character, sometimes brought on upon assuming some particular position in bed. The voice becomes nasal, with difficulty of pronouncing certain letters, as *l*, *r*, *m*, and *n*. Hearing is impaired, sometimes from insufficient supply of air in the upper larynx, causing retraction of the tympanum, but more often from extension of a low inflammatory process into the Eustachian tubes or from narrowing of the Eustachian orifice by adenoid growths.

Headache, loss of appetite, impairment of smell and taste, hawking and swallowing of glairy pharyngeal mucus, irritability of the nervous system, enuresis and minor and irregularly appearing nervous troubles are among the concomitants.

The foulness of the breath is marked. This arises from the presence of retained secretions in the tonsillar crypts, which in due time may result in the deposit of lime salts and the formation of tonsillar calculus. Certain changes in the appearance of the thorax were first described by Dupuytren, consisting of depression of the ribs on one side and a proportionate protru-

sion of the sternum in front. Since then, these have been made the subject of extended observation, and elaborate descriptions of the "chicken-breast," "barrel-chest" and "funnel-breast" have been furnished.

Treatment.—The weight of evidence, as given by eminent clinicians and by practitioners whose experience as specialists in diseases of the throat cannot be ignored, is in favor of operative interference, consisting of the prompt removal of all adenoid growths and of the enlarged tonsil. The argument advanced in support of this position rests upon the comparative uselessness of constitutional treatment or of local measures which stop short of a radical cure, and upon the immediate relief often afforded by surgical procedures of most distressing symptoms which had existed for a long period of time and had greatly affected the general health. The soundness of this teaching cannot be denied, especially in view of the fact that with the growth of the specialty devoted to affections of the throat cures have thus been achieved which would have been considered impossible a few decades ago.

On the other hand it must be conceded that the primary cause, the essential pathology of this affection, lies in a constitutional dyscrasia of which the growths upon the naso-pharyngeal mucous membrane, the chronic nasal catarrh and the tonsillar hypertrophy are but local expressions. If so, the removal of the offending structures, while it may and certainly often does give prompt, and perhaps immediate, relief of symptoms which it as yet seems impossible to reach by other means, does not in any sense constitute a cure of the patient. In fact, even specialists do not deny the recurrence of these growths and the necessity of repeating the operation in many cases. Furthermore, while we cannot refuse to accept the testimony in favor of radical surgical treatment, we have on the other hand no right to ignore the voice of those who earnestly affirm to have made cures by the exhibition of the indicated remedy alone.

Beyond doubt truth lies between the two extremes, and the indications for the most successful treatment are the prompt removal of morbid growths as soon as the uselessness of more conservative treatment has been demonstrated, and the eradication of the constitutional bias of the patient which is the

first and real cause of the difficulty. The former must not be delayed beyond the point of wisdom, and if the condition of the patient demands it, no hesitancy should be felt as to an immediate operation. Unwillingness to resort to surgical methods when these alone can give prompt relief is no less wrong than a determination to operate whenever an excuse for it may be found.

The power of the indicated remedy to modify and remove the constitutional tendency or taint which is responsible for the existence of the local affection has been amply demonstrated. The remedies most likely to accomplish this task are the deeply acting antipsorics and those which, like the iodides, have a specific action upon the glandular tissue. The most important are *CALCAREA IODATA*, *BARYTA IODATA*, *MERCURIUS IODATUS* and *ARSENICUM IODATUM*.

CALCAREA IODATA acts well when there is tendency to glandular enlargement and a sluggish temperament; fat, flabby children, late in learning to walk; profuse sweating, especially about the head; coldness of the extremities; feebleness of memory and mental dulness; eczematous condition; dull, heavy headache; scrofulous ophthalmia; hardness of hearing; muco-purulent discharge from the ear; nasal catarrh, with swelling at the root of the nose and thick, fetid discharge; ravenous hunger, with chronic indigestion and desire for chalk, hard boiled eggs, and indigestible substances. Characteristic diarrhoea; tendency to laryngeal catarrh.—*BARYTA IODATA*. Malnutrition; child mentally weak and backward; takes cold easily; nasal catarrh, with involvement of the middle ear; tendency to laryngeal catarrh; "habitual colic of children who do not thrive, who seem hungry but refuse food;" constipation with hard, knotty stools; sweating of the feet.—*MERCUR. IODAT. FLAV.* Particularly useful in cases where there is marked chronic post-nasal catarrh; the throat shows a pronounced tendency to suppurative inflammation from slight colds.—*ARSENICUM IODAT.* "The child is unevenly developed; emaciated limbs, with well-developed trunk; head large, neck small, abdomen distended. Tubercular habit, rachitic dyscrasia" (Fisher). Dark complexion; scrawny; skin dry, harsh, eczematous. Irritable.

Other remedies to be studied are: *LYCOPodium*, *SULPHUR*,

PSORINUM. The diet must be sustaining, digestible and selected with reference to the especial needs of each case. Cod-liver oil, regularly given for a long time, is helpful. In fact, everything must be done to improve the general health. Remedies must be exhibited for a long time and, if well selected, without change, even if the progress of the case is very slow. The aim of medication is to bring about a profound constitutional change which shall fortify the child against the serious mischief arising from even a slight cold or special liability to fall an easy victim to infectious diseases like diphtheria and scarlet fever, which thrive best upon structures already weakened by previously existing disease.

DISEASES OF THE ŒSOPHAGUS.

ŒSOPHAGITIS.

Inflammation of the œsophagus is acute or chronic. It may be caused by exposure to cold and damp or by extension of catarrhal inflammation from the mouth, pharynx and stomach, or from the extension of similar processes occurring in the specific fevers. In others it is the result of irritation from the use of very hot or very cold drinks or food, irritating medicines, strong acids, caustic alkalies, or the long-continued excessive exhibition of tartar emetic. It is also seen in connection with malignant disease of the œsophagus, as cancer. Occasionally it appears as a spontaneous affection in sucklings; these cases show a pronounced tendency to ulceration.

The *anatomical character* varies with the cause and type of the affection. In the common form, slight, if any, redness exists, but there is thickness and desquamation of the epithelium, swelling of the mucous follicles, and erosion. If due to the action of an irritant, the mucous membrane is bright-red and inflamed. If the inflammation is phlegmonous, there is much swelling of the mucous membrane and purulent infiltration, localized or diffuse, with gangrene in exceptional cases. Pseudo-membranous deposits may be present in connection with diphtheria, pyæmia, etc.; these usually involve the upper œsophagus.

Pustular œsophagitis occurs with small-pox or from the prolonged use of tartar emetic; if the latter, the lower portion of the tube is affected. The pustules may burst, leaving an eroded surface. A chronic catarrh of the œsophagus is described in connection with the enlargement and varicosis of the tube which occurs with senile and cirrhotic liver and with chronic heart-disease.

Symptoms.—Mild forms of œsophagitis commonly escape recognition. In more severe cases there is a sense of constrictive fulness in the œsophagus, with pain, much aggravated from swallowing. This pain may be pressive, lancinating, burning, shooting, its character depending largely upon the acuteness of the inflammation. In the average case it is not severe. If the result of swallowing a violent irritant, it is intense, even agonizing, and almost always associated with a corresponding painful inflammation of the mouth, pharynx and stomach. Deglutition in such cases is exceedingly painful, even impossible. The food frequently is rejected, and returns covered with mucus, blood, pus, or shreds of membranous matter. The patient here may complain of dull pain behind the sternum or between the scapulæ, and there is much sensitiveness to pressure in the upper portion of the tube. Dysphagia is worse in the recumbent than in the upright position. Few, if any, constitutional symptoms are noted in the average case. If severe, the tongue is coated, the breath fetid, and salivation copious. In extreme cases the gravity of the constitutional symptoms depends upon the severity and character of the primary affection, sometimes shock and collapse.

Cicatricial contraction and stricture are common sequels of inflammation due to local action of powerful irritants.

The diagnosis of mild cases is involved in uncertainty. If due to the action of some acid or caustic, the history of the case, as well as the pronounced character of the symptoms, leads to an easy recognition of the trouble. The introduction of the sound, and its return covered with blood, pus, membranous or necrosed tissue, demonstrates the presence of such tissue-changes as result from some form of violent inflammation.

Treatment.—Since only the severe cases are recognized, it is with them only that the physician is liable to deal. If due to some foreign body in the gullet, this must be removed or, if

that cannot be done, forced into the stomach. If some violent irritant has been swallowed, the proper antidote (caustic alkali: vinegar and water; acid: dilute alkali drinks) must be given at once. Dysphagia suggests the use of nourishing injections per rectum and bland, demulcent drinks, if they can be taken. The external application of ice is recommended. The early use of the bougie may assist in preventing stricture.

Therapeutics.—**ARNICA**. The œsophagus has been bruised by the passage of a foreign body. Stinging pain during deglutition.—**BELLADONNA**. Sensation as of “narrowing” in the œsophagus; as though a foreign body had lodged in it; exceedingly painful deglutition; spasmodic contraction of the œsophagus, causing regurgitation of food and drink, brought on by every attempt to swallow.—**CANTHARIDES**. Throat feels as though on fire; thirst, with aversion to all fluids; burns or scalds of the œsophagus.—**KALI BICHROMICUM**. “Burning sensation from pharynx or stomach; pain and feeling as though something remained in the œsophagus after swallowing solids.”—**PHOSPHORUS**. Hale reports two cases caused by **GELSEMIUM**, cured by **PHOSPHORUS**, but he gives no indications.—**RHUS TOXICODENDRON**. Burning and soreness in the œsophagus; throat feels swollen internally; pricking pain, as if a pin had lodged in the throat; feeling of contraction in the œsophagus; dysphagia with stinging pain during deglutition (Laird).—**VERATRUM VIRIDE**. Great dryness and heat in the throat; burning in the fauces and œsophagus; spasm of the œsophagus with or without rising of frothy and bloody mucus.

STRICTURE OF THE ŒSOPHAGUS.

Stricture or stenosis of the œsophagus is congenital or acquired. The former is very rare; the latter is due to narrowing of the gullet by enlargement of the mucous and submucous tissues, with or without fibrous deposits, but oftener to cicatricial contraction from the healing of ulcers in the wall of the œsophagus, to cancerous growths or polypoid tumors projecting into the gullet, or to external pressure from enlarged glands, tumors or aneurism.

The occlusion may occur at any point or may involve the entire length of the tube; in exceptional cases several well-defined

strictures may exist. The degree of the narrowing differs; it may be inconsiderable or almost amount to a closure. If due to cicatrization, the stricture is more likely to be at the upper or lower end of the gullet. If high, food is rejected at once or very soon; if low, it accumulates above the point of stricture, forcing the walls outward, and is then ejected in larger quantities; the alkalinity of the food and its freedom from "gastric" odor are important diagnostic points. This retention of food in the œsophagus—the stricture preventing its entrance into the stomach—necessitates bulging and yielding of the œsophageal wall, and eventually brings about an enlargement of the gullet above the point of stricture, with hypertrophy of the wall.

Symptoms.—The symptoms of the stricture are increasing difficulty of swallowing food, especially in large morsels, until at last even liquids cannot enter the stomach. The ineffectual attempts to swallow are accompanied by much distress, and followed by spasmodic contraction of the gullet, sense of constriction and suffocation in the throat and chest, distress behind the sternum—sometimes in the stomach—, palpitation of the heart and other nervous disorders. Emaciation, extreme in cases where the stricture borders upon occlusion, is a constant symptom, and starvation eventually results, unless death occurs from the severity of local complications (as rupture or gangrene) or from the development of some profound constitutional disease attacking the debilitated and vitiated system (tuberculosis).

The diagnosis usually is easy, because the symptoms are well-pronounced. Auscultation may be helpful in fixing the exact location of the stricture. The patient is directed to fill the mouth with water, and is made to swallow after the ear of the physician has been placed to the left of the spine. If stenosis exists, a splashing, gurgling sound can usually be heard at the seat of the stricture. The bougie will verify the site and prove the extent of the stricture. The patient is placed in a chair, the head well backward. A large bougie is passed into the pharynx, under the guidance of the index finger of the left hand. The bougie, or gum-elastic stomach tube, is then gently slipped along the wall of the pharynx, to one side of the median line, into the œsophagus. The cricoid cartilage offers some slight

obstruction, which, however, is readily overcome. An instrument of large size must be employed, and the manipulation conducted patiently and gently lest the tube enter a diverticulum or pass through diseased, softened tissue (cancerous ulcer).

The prognosis must be guarded. Strictures due to the existence of cicatricial tissue in the pharynx are, as a rule, amenable to proper treatment. If depending upon mechanical pressure, the removal of which comes within the reach of surgical science, a recovery may be looked for. If due to congenital malformation, the prognosis is unfavorable. If from malignant disease, a recovery cannot be expected.

Treatment.—The treatment is almost entirely surgical. Remedies can do little more than aid in controlling special symptoms. *BELLADONNA*, *IGNATIA*, *CONIUM*, *HYOSCYAMUS*, *NATRUM MURIATICUM*, *NUX VOMICA*, *PULSATILLA*, and others, have been recommended. B. F. Joslin gives the following:

BELLADONNA. Sensation as of a lump which cannot be removed. Impeded deglutition or entire inability to swallow even liquids. Short-lasting, but frequently recurring, contraction of the œsophagus. When swallowing, one experiences a sensation in the throat as though the parts were too narrow, contracted, as if nothing would go down. Pressure in the throat with choking ascending from the abdomen.—*IGNATIA*. Sensation as if one swallows over a lump. Strangulating sensation in the middle of the fauces, as if a large lump had lodged in the throat. Difficulty in swallowing solid or liquid food.—*MERCURIUS*. Sensation as if something had lodged in the throat. Difficult deglutition. He had to press very hard to get something down. Spasmodic difficulty in swallowing, with danger of suffocation. Aching pain in the œsophagus.—*NATRUM MURIATICUM*. Sensation as though a plug had lodged in the throat. Spasms in the pharynx. When swallowing, she found it very difficult to get the food down or bring it up again, so that she came near suffocating.—*PULSATILLA*. Sensation on swallowing as if the back part of the throat were narrower than usual or closed by swelling. Sensation as if the pharynx were swollen. When swallowing, he feels as though the throat were swollen. Difficult swallowing, as if from paralysis of the muscles of deglutition. Choking pain in the pharynx, as from swallowing too large a morsel.

It is safe to add that actual clinical experience with the indicated remedy alone has not been satisfactory.

Feeding by means of the stomach tube and per rectum sooner or later becomes necessary.

DILATATION OF THE ŒSOPHAGUS.

In very rare cases dilatation may be primary; almost always it follows previous constriction of the œsophagus, as explained in the preceding chapter. It may be partial or general.

A *diverticulum* consists of an enlargement or pouch in the gullet, made by pressure or traction. If by pressure, it is commonly found at the pharyngo-œsophageal juncture, due to the comparative weakness of the muscles there, and occurs in shape of a saccular pouch. If made by traction, it is more often situated at the anterior wall, near the bifurcation of the trachea, the gullet being drawn outward by inflammatory adhesion extending from the lymph glands. A small diverticulum which communicates through a narrow opening with the œsophagus rarely gives rise to much trouble; if large, forming a blind pouch, it intercepts the passage of food into the stomach and may cause stricture.

Symptoms.—Small diverticula and moderate dilatation do not create sufficient disturbance to attract the patient's attention. If the dilatation is large, difficulty of swallowing and rumination of food are noted. Food frequently is retained for a long time, undergoing chemical changes, causing exceedingly foul odor from the mouth and terribly offensive breath. Eventually the dilatation may be so great as to give rise, by pressure upon the trachea, blood-vessels and nerves, to serious embarrassment of respiration, circulation and innervation. If the dilatation is in the upper œsophagus, the swelling may be detected behind the trachea, remaining there until the detained food has been ejected by vomiting or regurgitation, when it promptly disappears.

The symptoms of large diverticula closely resemble those of dilatation, save that the regurgitation of food is delayed several hours and the detained mass is even more offensive.

In either case nutrition soon becomes seriously deranged; emaciation and great weakness follow; the face looks haggard

and expressive of severe, habitual suffering. Death takes place from perforation of the œsophagus or from starvation.

The prognosis is decidedly unfavorable.

Treatment is unsatisfactory and largely mechanical. Internal medication can do little more than relieve pain and thus prolong life. Common sense suggests the use of liquid food, and, in case of diverticula, their administration through the stomach tube.

RUPTURE AND PERFORATION.

Rupture of the healthy œsophagus has resulted from prolonged violent vomiting; it is exceedingly rare and invariably fatal. When the walls of the gullet have been weakened by atrophy, or ulceration, or destructive processes, retching and vomiting may easily cause rupture, more often at a point just above the diaphragm. The rupture may be longitudinal or transverse, usually the former. With it, there is escape of the contents of the œsophagus into the surrounding connective tissues or into the trachea, pericardium, lungs or pleural sac.

Perforation occurs from within outward from abscess or perforation of the gullet, or from injuries to its structures received from foreign bodies; from without inward, as the result of pressure upon the œsophagus, as from aneurism of the aorta, or of ulceration or destruction involving adjacent tissues, as tubercular ulceration, retro-pharyngeal abscess, caries of vertebræ, etc.

The symptoms are sudden, sharp pain in the breast, sensation of a tear in the gullet, vomiting, coughing, paroxysms of choking, orthopnœa, hæmorrhage, shock and collapse. If the results are not immediately fatal, purulent or gangrenous inflammation of the injured structures and of the tissues invaded by the expelled contents of the œsophagus necessarily follows.

The diagnosis is positive when these symptoms occur in a person suffering from disease of the œsophagus.

The prognosis is bad, save in very exceptional cases when the rupture or perforation is so small that it allows of the escape of only a trifling amount of the contents of the œsophagus.

Treatment consists chiefly of absolute rest of the injured parts.

Rectal feeding alone is allowable, since the use of the stomach pump is obviously dangerous. The relief of thirst is a perplexing task, and may be in part accomplished by frequent sponging of the body in tepid water or rinsing of the mouth with acidulated drinks, or by holding bits of ice in the mouth. Stimulants may have to be used hypodermically. If death does not take place at once, remedies indicated by the totality of symptoms may be administered as the conditions allow.

MORBID GROWTHS—CANCER.

Morbid growths of the œsophagus are benign or malignant. The former are rare, and consist chiefly of fibroid polypi. They are of slight importance clinically, save that they occasionally become a source of irritation and, from their bulk and situation, of annoyance.

Malignant growths are much more frequent. Cancer of the œsophagus is not an uncommon disease. The varieties seen are the epithelial, medullary, and scirrhus, of which the epithelial ranks first in the order of frequency. Ziemssen affirms that primary cancer of the gullet is always epithelial.

Cancer of the œsophagus is usually primary. It begins in the submucous tissue and soon involves the mucous membrane. Its favorite location is the upper third of the gullet, but it may select some other portion, or the entire tube may be affected. Its growth is attended with narrowing of the tube (stricture) at the seat of the disease, dilatation and hypertrophy above, and atrophy and collapse below. Its progress is marked by disintegration and sloughing of tissues, with such complications as are incidental to cancerous growths elsewhere. There may be metastatic deposits in brain, kidney, lungs, and liver, or invasion of adjacent organs, as the viscera of the thorax. Perforation eventually takes place into the lung, trachea, bronchus or mediastinum, or destruction of the walls of blood-vessels (aorta) may occur, or even adjacent osseous tissues (vertebræ) may become involved.

Symptoms.—It is not often possible to recognize this disease until after there has been dysphagia and pain in the œsophagus—at first rather a vague distress—with possible loss of flesh. The difficulty of swallowing increases, and there is regurgita-

tion of food recurring within a short time after swallowing if the upper third of the gullet is the seat of the cancer; this is deferred for ten or fifteen minutes, or longer, if the growth is situated near the stomach. The regurgitated mass contains mucus, blood, shreds and fragments of cancerous tissue, according to the stage of the disease. Violent tearing, pricking, burning pain, often extending upward, again into the stomach or towards the shoulders and spine, may be the cause of much suffering; in other and rare cases pain is practically absent. Difficult, weak speech, sometimes aphonia, and dyspnœa may result from pressure of the growth upon the recurrent laryngeal nerve and upon the larynx and trachea. As swallowing becomes more and more difficult and painful, emaciation becomes correspondingly pronounced. Enlargement of the cervical lymph-glands is frequently seen, often even in the early stage of the disease. The constitutional symptoms of the cancerous cachexia, when fully developed, are easily recognized. Death eventually takes place from perforation, hæmorrhage or marasmus.

The diagnosis of cancer of the œsophagus depends upon the severity of the pain, the gravity of the characteristic constitutional symptoms, the presence of a cachexia, and the recognition, under the microscope, of the cancer cell. "In persons over fifty years of age persistent difficulty of swallowing accompanied by rapid emaciation usually indicates œsophageal cancer" (Osler).

Pains must be taken to exclude, by careful laryngoscopic and other examination, especially in the early stage, aneurism, benign growths, and stricture.

The prognosis is hopeless.

Treatment.—The treatment is largely surgical. Benign growths can usually be removed. In malignant disease the aim is to prolong life and to make it endurable, a cure being out of question.

The diet must be nourishing and will usually consist of liquid food, as milk, broths, etc. The stomach tube will be useful until ulceration has been established, when it must be put aside, and food be administered per rectum. Medication has accomplished no positive results. ARSENICUM ALBUM, ARSENICUM IODATUM, LACHESES, HYDRASTIS and CONIUM are more likely

than others to ameliorate the pain and retard the progress of the disease.

THE NEUROSES OF THE ŒSOPHAGUS.

Sensory derangements affecting the œsophagus are little understood and rarely recognized. Motor derangements have been studied more successfully; they may be divided into Spasmodic Stricture and Paralysis. Spasmodic Stricture, Œsophagismus or Œsophagospasmus may be idiopathic or symptomatic. In the former no definite anatomical lesion exists to account for the occurrence of the spasm of the gullet; in the latter a specific cause for the irritation may be assigned.

In the majority of cases the patient is of a decidedly neurotic temperament and presents clear-cut symptoms of functional nervous disease. Women, especially at those periods of life which involve a special strain upon the nervous system, as pregnancy and the menopause, or young girls at the age of puberty, furnish many cases. Men are not exempt. Elderly men, afflicted usually with hypochondriasis, suffer from œsophageal spasm. The writer has seen several cases in young boys of an inherited neurotic tendency which had been intensified by false living and further irritation of the enfeebled nervous system by masturbation. Cases are also noticed in connection with epilepsy, chorea, hysteria, hydrophobia.

At times the affection is due to local irritation, such as a mild inflammation of the tube, or the pressure in the gullet of some foreign body or of a morbid growth, as an aneurism; or to irritation of a nerve, as the peripheral branch of the pneumogastric. Again, it may be reflex in character, as in cases of intestinal irritation from worms, constriction at the anus, hæmorrhoids, or gastric, uterine or ovarian disease. In all these conditions, however, the existence of a neurotic temperament is an important factor, and commonly some powerful emotional disturbance is responsible for the first appearance of the spasm.

Occasionally, the *habit* once established, the affection becomes very distressing because the spasms appear from trifling causes and are slow to yield to treatment.

Symptoms.—Sudden difficulty of swallowing food is the most important and characteristic symptom, generally associated

with more or less substernal pain, hiccough, difficult breathing and excessive nervousness, often with the fixed conviction that death from choking is imminent. In many cases marked excitement is present. If the spasm affects the upper third of the tube, food or drink is rejected almost at once; if near the cardiac portion, it is retained for some time, to be returned mixed with mucus and occasionally slight traces of blood. In stubborn cases dilatation of the gullet above the seat of the stricture may occur, with retention of food for a considerable time. Liquids are more easily swallowed than solids, though the reverse may obtain. The paroxysm usually is of brief duration, but in aggravated cases may be so persistent—lasting for days—that it causes much concern. The spasms recur periodically or at irregular intervals. If persistent, the general condition of irritability of the nervous system from weakness increases and is intensified by the insufficient nutrition of the body. In many cases the disappearance of the spasm, as in other seizures of a hysterical character, is followed by copious emissions of flatus and of watery, limpid urine.

Diagnosis.—The totality of the symptoms in so many cases clearly expresses the neurotic element at work that it at once places the physician on his guard. The suddenness with which the dysphagia appears is striking, but not of much diagnostic value since the same occurs in connection with cancer. The intermittency of the paroxysms is, however, of much importance. The introduction of the bougie is rarely difficult of accomplishment here, and almost always affords relief; in some instances it even appears to effect a cure.

The prognosis is good. Fatal cases are very exceptional.

The duration of the disease varies, some cases yielding promptly, while others continue for an indefinite period of time.

Treatment.—The treatment includes the use of the sound, which, as stated, may actually cure. It is not necessary to point out that great care must be exercised in the use of the sound to avoid serious or even fatal accidents by rupturing the wall of a tube weakened by inflammation or ulceration, or by forcing the instrument into an aneurism or cancerous mass.

Electricity has proved serviceable. Rockwell advises, for their constitutional tonic effects, both general faradization and central galvanization as “more successful than anything else.”

Locally he urges the use of the galvanic current. "One pole (cathode) may be placed upon the back of the neck, over the cilio-spinal center, while the anode is held just above the sternum, or by the inner border of the sterno-cleido-mastoid muscle. If this fail, an insulated œsophageal electrode with a metallic tip should be introduced into the œsophagus to the point of spasm, while the other is placed on the back of the neck. Both currents can be used in this way, but special caution is to be exercised in the application of the galvanic current, on account of the proximity to the pneumo-gastric. It is not inconceivable that over-excitation of these nerves might be attended with serious results. The galvano-cautery has sometimes proved a most effective procedure in these cases after the failure of the ordinary electrical applications" (International System of Electro-Therapeutics).

Diet must be nourishing, chiefly liquid, and, if necessary, given by means of a tube.

The internal use of properly indicated remedies is usually satisfactory here; in many cases, by virtue of their relation to the morbid conditions primarily at fault, they accomplish much more than any other measure. The following are specially serviceable: ASA FÆTIDA. In nervous, hysterical people, with mental and physical hypersensitiveness. Sensation in the œsophagus as if peristaltic action were reversed, proceeding from below upward, obliging him to swallow frequently. Food, when partially swallowed, returns to the mouth. Gastric flatulency, causing distress in the stomach and about the heart, with choking sensation in the throat and great anxiety.—BAPTISIA. It has well-marked "inability to swallow solids;" cannot swallow anything but liquids. Constriction of the œsophagus from the pharynx to the stomach. Its clinical record in this affection is good.—BELLADONNA. Violent and spasmodic contraction of the œsophagus, causing the food to be expelled. Sensation of narrowness of the parts, of constriction. Spasms brought on by every attempt at swallowing, yet constant desire to swallow. Foreign bodies in the throat.—COCCULUS. Burning dryness of the œsophagus. Taste of sulphur in the mouth. The local symptoms are not strongly characteristic, but the remedy is of great value when spasm of the gullet exists in choreic or epileptic persons, with a tendency to par-

alysis. There is hyperæsthesia, insomnia, and a general state of "weakness from irritability" of the nervous system. Aggravations during menstruation, with headache and vertigo, faintness and goneness, mental dulness and hypochondriasis.—**CROTALUS**. Great muscular weakness and trembling. Chronic spasms of the œsophagus, occurring in connection with atonic dyspepsia, "with continual throbbing, occipital headache, trembling, fluttering feeling below the hypogastrium, towards the umbilicus; tongue very red and small, feet swollen." Dysmenorrhœa. The throat is very sensitive; cannot swallow anything solid; even soup must be strained to remove from it all meat fibres and solid particles. Pain out of proportion to the visible trouble.—**HYDROCYANIC ACID**. Spasm in pharynx and œsophagus, with heat, inflammation, and inability to swallow. Like **COCCULUS**, the local indications are overshadowed by the constitutional symptoms. It is particularly useful in cases of irritability resulting in tetanic contraction of muscular fibre, especially in hysterical subjects. Faintness, goneness at the stomach, coldness of skin and of extremities, feeble and irregular action of the heart. Chronic dyspepsia, with vomiting of food in the evening and at night. Gurgling noise in the throat when swallowing a drink.—**HYOSCYAMUS**. Can swallow warm solid food better than liquids. Tendency to hysteria, epilepsy and nervous diseases characterized by convulsive action. Violent and demonstrative. Convulsive, nervous cough.—**IGNATIA**. In hysterical cases, with irritability of muscular fibre, characteristic mental symptoms (quiet grief and despondency; alternate laughing and crying); empty, gone, faint feeling at the stomach, better from taking food; excessive flatulency, with palpitation of the heart; nervous cough which can be suppressed by a strong effort of will, and grows worse as the patient yields to the desire to cough; sympathetic cough, with uterine or ovarian troubles or from intestinal irritation (worms). Spasms of œsophagus from mechanical irritation.—**LACHESIS**. Hysterical condition, especially when characterized by insane jealousy. Characteristic sensitiveness of the throat to touch; fluids return through the nose; aggravation upon waking from sleep.—**NAJA TRIPUDIANS**. "Spasmodic stricture of the œsophagus; hardly anything can pass into the stomach; laryngismus from spinal irritation affecting nucha"

(Lilienthal).—PHOSPHORUS. Great exhaustion and irritability of the nervous system. Drink and food vomited up soon after it has reached the stomach. Characteristic gastric affections. Not often indicated, but none the less important because of its relation to profound primary disturbances.—PLUMBUM. Useful on account of its profound action on the brain and nervous system. Restlessness; hyperæsthesia; convulsions; epilepsy; paralytic tendency, with trembling of the extremities from slight exertion or from excitement. Sensation as of a ball rising from the throat into the head; paralytic condition of the pharyngeal muscles, with difficult swallowing of liquids. Severe spasms of the sphincter ani in connection with constipation and hæmorrhoids.—STRAMONIUM. Violent contraction of the throat; deglutition is almost impossible; terrible spasm of the throat when attempting to swallow; hysteria, with convulsive excitement, from fright. Hysterical hydrophobia.—VERATRUM VIRIDE. Hysterical and epileptiform convulsions. Acute inflammation of the Œsophagus, with fiery, burning pain. Spasm of the Œsophagus with or without rising of frothy, bloody mucus.

Consult also ALUMINA, BRYONIA, CICUTA, ELAPS, KALI CARBONICUM, LAUROCERASUS, NATRUM MURIATICUM, PULSATILLA.

Paralysis of the Œsophagus may be partial or complete, and is almost always of central (bulbar) origin. The practitioner sees it in connection with paralysis of the tongue, palate, pharynx or larynx, or as a feature of general paralysis. Inability to swallow is its most conspicuous symptom. Large mouthfuls of food are usually more easily swallowed than smaller morsels, and solids easier than liquids. There is no obstruction to the passage of the sound.

The prognosis is unfavorable.

Treatment is unsatisfactory. Electricity, so far, has given slight and temporary results only in exceptional cases. Of remedies, COCCULUS, PLUMBUM, GELSEMIUM and PHOSPHORUS are the most promising. The selection of the remedy involves an exhaustive study of the totality of symptoms, and in the course of such a study clear indications may be found for the exhibition of remedies which are not suggested by the local affection. The administration of food requires great care in advanced cases. The stomach tube and, later, rectal feeding are indispensable.

DISEASES OF THE STOMACH.

ACUTE GASTRIC CATARRH.

Acute gastric catarrh, acute gastritis, acute dyspepsia or gastric fever, is a common affection. The term acute gastritis or acute gastric catarrh is used in a broad sense, practically embracing the entire range from a slight, transient ailment to a severe, destructive inflammation. The common, light form is generally known as acute indigestion.

Acute catarrh occurs in all climates and at all ages, perhaps with a preference for the quite young and the old. It is almost always caused by some error in diet, such as over-eating or the use of unwholesome food. Not being properly digested, such food undergoes partial decomposition in the stomach and becomes a source of irritation. Persons who naturally have a "weak," irritable stomach cannot digest what to others is a moderate and wholesome meal, both in quantity and quality; thus, idiosyncrasy and predisposition are important ætiological factors.

Whatever unduly irritates the gastric mucous membrane is liable to cause gastric catarrh. Hence the evil effect of powerful drugs and especially of alcohol upon the stomach. Gastric catarrh occurs also in connection with infectious fevers (scarlet fever, measles, small-pox, typhoid fever, etc.) and, occasionally, as the result of metastasis in gout or acute rheumatism.

Morbid Anatomy.—The pathological condition is a hyperæmia of the gastric mucosa, of varying degree and extent. The mucous and peptic cells become filled with granular matter and fat globules; the mucous membrane assumes a puffed and swollen condition, preventing the discharge of the gastric juices into the stomach. The surface of the stomach is covered with tenacious mucus of alkaline reaction. Extravasation of blood-corpuscles, both red and white, often takes place. In severe cases the epithelial covering may be destroyed. Erosions and slight hæmorrhages often occur.

In very severe cases septic and gangrenous inflammation may result, with extensive sloughing and considerable bleeding.

Symptoms.—The light form of acute indigestion consists of little more than a sense of discomfort or pain in the stomach which appears within a few hours after committing some error of diet, accompanied with a sense of indisposition, headache, nausea, eructations and vomiting. The latter, in these light cases, is rarely very severe or painful, and the prompt expulsion of the offending substance affords ready relief. The ejected matter consists of mucus, food and slight admixture of bile. There is some coating of the tongue and fever. A few diarrhœic stools may be had, especially in children. Recovery takes place quickly, probably within twenty-four hours. In some cases even slight attacks are accompanied with "sick" headache.

If the case is rather more aggravated, copious evacuations from the bowels take place, and are followed by relief. Should the bowels, however, be constipated, the gastric disturbance is liable to continue. The tongue is then covered with a heavy white or yellowish fur; the breath becomes offensive; spells of vomiting occur at brief intervals, and there is persistent frontal or occipital headache. The patient appears nervous and fretful; short spells of shivering alternate with fever and a moderate elevation of temperature. After a time the patient grows drowsy and enjoys a long, heavy sleep from which he awakens refreshed and nearly well.

In still other cases the gastric symptoms, especially the vomiting, are sufficiently pronounced to cause much distress. Pain in the stomach is severe, of a dull, heavy, aching character, sometimes a feeling as of a stone or heavy load in the stomach. It may be associated with gnawing and faintness. The tongue is heavily furred; there is frequent vomiting of sour and bitter mucus and bile, belching of foul-tasting gas, having the odor of sulphuretted hydrogen, with shivering, fever, unrefreshing, anxious sleep, and scanty discharges of urine of dark color and rich in urates. The abdomen may be distended and somewhat tender to pressure. This condition continues for two or three days, followed by an uneventful recovery.

A slight looseness of the bowels is common and desirable; cases where constipation exists are more liable to be severe and usually get well slower.

Subacute gastritis, still called gastric fever by some writers,

consists of the same grouping of symptoms, but more intense and unyielding in character. Chills of some severity take the place of the shiverings; these are followed with a temperature of 100° to 102° , sometimes with pronounced evening exacerbations. Pain in the epigastric region may or may not be present; if present, it is dull, sometimes sharp, pressive, radiating into the chest, back and hypochondria. There is loss of appetite, but occasionally craving for food, which is chiefly due to the gnawing and faintness at the stomach. The patient is thirsty, but eating and drinking gives rise to distress and vomiting. The latter often is very persistent, easily provoked and painful; the ejected matter consists of glairy mucus, mixed with water, food, bile and possibly tinges of blood. The tongue, at first thickly furred, becomes red, raw, even fissured, with enlarged red papillæ. The lips are sore and covered with fever blisters. Gastric and intestinal flatulency with emissions of foul gas and considerable uneasiness may be present, and there often is much epigastric and abdominal distension, with tenderness and soreness upon pressure. Prostration, headache, dizziness and restlessness, with unrefreshing, disturbed sleep, add to the patient's discomfort. This form of gastric catarrh runs a course of from a week to ten days.

Acute gastric *catarrh of infants* occurs during the heated term, chiefly in bottle-fed, badly nourished children, and is a more serious disease than the forms already described. The symptoms are sudden and violent at the start. Frequent, if not constant, vomiting of curdled milk occurs, sometimes of sour, watery mucus mixed with curdled milk, accompanied with great pain in the stomach. The gastric irritability is pronounced, food and drink being ejected as soon as swallowed, with manifestation of much suffering. There usually is abdominal tenderness. Soon active diarrhœa of a watery, copious, exhausting character sets in, with great prostration, rapid emaciation, and a train of symptoms which may terminate in cerebral disease, coma and death.

The gastric *catarrh of drunkards* is slow in development, but exceedingly persistent. Its most marked symptoms are profound anorexia, and habitually and heavily coated tongue and thirst.

Toxic gastritis is due to the action of some powerful irritant

upon the stomach, as concentrated mineral acids, alkalies, or large doses of arsenic, phosphorus or antimony. There is violent inflammation of the gastric mucous membrane and underlying structures, with intense pain in the mouth, throat and stomach; great difficulty of swallowing; constant painful vomiting of glairy, stringy mucus, containing blood and shreds of mucous membrane; intense thirst with immediate aggravation of vomiting from drinking. The tongue is dry and glazed; there is profound prostration, with coldness of the extremities, weak and irregular pulse, difficult breathing, and pale, haggard countenance, expressive of anxiety and keen suffering. Diarrhœa of watery, bloody stools with colic and tenesmus proves the extension of the inflammation to the intestine. The entire abdomen is distended, tender and sensitive to even slight pressure. The urine becomes scanty, albuminous, even suppressed. Symptoms of collapse declare themselves. The vomit assumes a coffee-ground color, and death results from hæmorrhage or collapse. If the termination of the case is not immediately fatal, ulceration is likely to occur, resulting in œsophageal stricture, chronic hypertrophy of the stomach, and death from exhaustion.

Still other forms of acute gastritis are described, but these are difficult of recognition, at least during life, and of slight importance to the practitioner. Here belongs the *diphtheritic* or *membranous* form, which occurs in diphtheria or as a secondary affection following typhus or typhoid fever, pneumonia, small-pox, etc. Acute *suppurative* or *phlegmonous* gastritis consists of suppuration in the submucous tissues; it is exceedingly rare, and may be idiopathic or appear as an expression of sepsis (puerperal fever) or as the result of trauma. It has not been recognized *ante mortem*. Gastritis due to the presence of parasites, larvæ of insects, specific organisms, as the bacillus gastricus of Klebs, have been described, but are of interest only because of the infrequency with which they occur and the difficulty of recognizing them.

Diagnosis.—The diagnosis is rarely difficult. The knowledge that the early stage of infectious fevers often presents similar symptoms suggests the wisdom of being guarded in expressing an opinion. When the fever is comparatively high, acute gastric catarrh may bear a close resemblance to abortive

forms of typhoid fever. The absence, in the former, of bronchial irritation and cough, of splenic enlargement and of rose spots, with the character of the fever itself—abrupt rise, slight remissions, sudden drop—will establish the diagnosis. From cardialgia gastric catarrh is distinguished by the steadiness of the pain, the irritability of the stomach, its refusal to retain food or drink, and the probability of intestinal irritation as expressed by intestinal flatulence, abdominal distension and tenderness and, often, diarrhœa.

Toxic gastritis. The history of accidental or deliberate poisoning is almost always clear. The action of the poison upon the mouth and throat is intense and may be seen. The attack comes on suddenly, the symptoms are severe from the very beginning, and there is a tendency to a rapidly fatal termination.

The prognosis is favorable, except in cases occurring in young infants, where it must be guarded on account of possible extension of the inflammation to other parts and the complications which so readily arise. Toxic gastritis is almost always fatal.

Treatment.—In mild cases medical treatment is practically unnecessary. Bicarbonate of soda, dissolved in water, is helpful when there are eructations of acid fluid. Abstinence from food for a short time is invariably to be encouraged. Attempts to stop vomiting, save as it is controlled by the indicated remedy, may be set down as worse than useless.

In severe forms, copious draughts of hot water ease the distress of vomiting and greatly lessen the pain in the stomach. In the average case, absolute rest of the stomach is of the greatest importance, and must be insisted upon if the patient is liable to recurrence of the attacks. The return of a natural desire for food is an indication that the patient may eat, at first cautiously, of simple and easily digested substances. Milk, diluted with lime-water or soda-water, then oat-meal gruel, and later meat-broths, especially mutton-broth from which the fat has been carefully removed, constitute a safe diet for the period immediately following an attack. Occasionally a craving exists for *cold* food, and experience has shown that it may be gratified within the limits of good sense; small draughts of cold milk and ice-cream in small amounts, allowed to dissolve in the mouth before it is swallowed, are grateful and unobjectionable.

If pain and tenderness are severe, hot poultices (linseed meal) or hot fomentations (water or infusion of the flowers of hops) may be used. If vomiting is excessive, bits of ice in the mouth, iced Vichy or iced Champagne, cautiously given, may afford relief.

The use of luke-warm water, taken persistently in large amounts, a glassful at a time, will aid in removing from the stomach the cause of the irritation, and thus serve an excellent purpose. Opiates and stimulants are not indicated, save very exceptionally.

In the acute gastric catarrh of infants, absolute rest of the stomach is quite as important as in adults. It is folly to pour into the irritated organ under the guise of food that which is bound to become an additional source of irritation and distress. If feeding is absolutely necessary, and rectal alimentation is objectionable or unsatisfactory, thin oat-meal or barley gruel, carefully strained, or small amounts of mutton broth, wholly free from fat, are rather safer than milk. Thirst may be relieved by the free use of warm water.

Therapeutics.—The remedies usually indicated are: ACONITE, ANTIMONIUM CRUDUM, ARSENIC, BELLADONNA, BRYONIA, CHELIDONIUM, HYDRASTIS, IPECACUANHA, IRIS, NUX VOMICA, PHOSPHORUS, PULSATILLA, PODOPHYLLUM, VERATRUM ALBUM, and BISMUTH.

ACONITE. After taking cold. Stitch-like, burning, pressive pain at the pit of the stomach, with anguish and fear of death. Quick, hard pulse, with pungent heat of the flesh, and constant restlessness and tumbling about in bed. Fever with great thirst and vomiting of mucus and bilious matter.—**ANTIMONIUM CRUDUM.** Total loss of appetite. Tongue coated thickly yellow or white, as though covered with skimmed milk. Great thirst at night, nausea, belching, with taste of the food that has been eaten. Vomiting. No fever. Useful in saburral derangements; after use of sour, spoiled wine.—**ARSENIC.** Gastric catarrh from the abuse of iced drinks or foods; also from the abuse of tobacco, especially of chewing tobacco. Nausea and vomiting, worse from rising; burning pain in the stomach and abdomen; quick, light pulse; dryness of the skin, which may be hot or cold; tongue dry and red, with sides furred, with red streak down in the middle; great thirst, restlessness and

anxiety, prostration; watery, thin, dark diarrhœa, very offensive. Anxious, pale, hippocratic face. Feeling of heavy load or stone in the stomach.—**BELLADONNA**. Pain in the stomach acute, pressive, extending to chest and shoulders; great distension and bloating in the pit of the stomach and abdomen, worse from motion and pressure, and rendering breathing oppressive; deficient breathing, anguish, vomiting, gagging, hicoughing; great thirst, with aggravation from drinking; tongue dry and furred or covered with white, tenacious, yellow-white mucus. Congestive type.—**BISMUTH**. Burning in pit of the stomach; gagging, vomiting of bile, provoked from even slight motion. Gastric flatulency; cadaverous, offensive diarrhœa.—**BRYONIA**. Stitching pain in the stomach, worse from motion; tongue coated whitish or dark yellow-brown; dryness of mouth and lips, without thirst; or intense, constant thirst for large amounts of water. Constipation; the stools are dry and look as though burnt; flatulency. Especially useful in hot weather, when the gastric irritation is the result of taking cold drinks when heated.—**CHELIDONIUM**. Biliaryness. Nausea, bilious vomiting. Tongue is slimy, coated white or gray; heavy yellow coating of the tongue, with red margins, showing the imprints of the teeth. Tearing, darting, throbbing headache, in the forehead and temples, with heaviness and coldness in the occiput, accompanied with vomiting, melancholy, anxiety.—**HYDRASTIS**. Dull, aching pain in the stomach, causing weakness and faintness in the pit of the stomach; sensation of heaviness in the stomach. Tongue coated white or with yellow stripe; feels as if burnt or scalded; on the tip of the tongue, a vesicle which is very sore. Acidity; constipation.—**IPECACUANHA**. Constant sickness at the stomach; easy vomiting; empty eructations and copious accumulation of saliva; great bloating of the stomach; pain in the anterior abdomen, extending to the left hypochondric region, and upward; headache as if the skull were bruised; diarrhœa, with much griping, green, dark; tongue flabby, clean, yellow or white. Especially useful after eating unripe fruit.—**IRIS**. Intolerable burning distress in the stomach; short spells of colic; pain in the epigastrium; streaks of pain radiating from the umbilical region into the epigastrium; nausea, straining, belching of wind; vomiting of mucus and bile, with diarrhœa, accompanied with burning in

the anus and great prostration; burning in the mouth, fauces and œsophagus. Sick headache.—*NUX VOMICA*. Sour, bitter taste in the mouth. Tongue coated white or yellow. Fulness and dull, heavy pressure in the stomach. Dizziness with severe frontal headache and irritability of temper. Worse in the morning, in the open air, after eating.—*PHOSPHORUS*. Acute, burning pain in the pit of the stomach; soreness in the region of the stomach; shivering; cramp in the stomach, radiating from the liver; vomiting of watery substances, at times mixed with blood; great thirst for cold drinks which are not retained in the stomach after they get warm; tongue dry, coated white.—*PULSATILLA*. No appetite; no thirst; tongue coated white or yellow, with tenacious mucus; edges feel as if scalded; mouth parched and dry, still wants nothing to drink; bitter taste in the mouth and of everything he eats; dizziness when arising from a chair; chilliness; stitching pain in the stomach, worse from motion or from a jar; perceptible pulsations in the stomach; tension in epigastric region, extending upward. Attack brought on by the injudicious use of ice-cream, fruit, rich pastry.—*PODOPHYLLUM*. Everything in the stomach turns sour; belching of sour, hot flatus, with great thirst and sour, bitter vomiting, preceded by distressing nausea and accompanied with such violent contractions of the stomach that the patient screams with pain; vomiting of bilious matter, mucus and blood; tongue furred, white, dry, yellow; foul taste in the mouth.—*VERATRUM ALBUM*. Violent vomiting, with constant nausea; utter prostration; pains radiate from the stomach upward and to both sides and to the back between the scapulæ; it becomes agonizing and then gradually subsides; coldness, fainting; hippocratic face; watery, gushing diarrhœa; cannot bear the slightest motion, for it brings on immediate aggravations; tongue cold, covered white, with red tip and edges or coated yellowish-brown.

CHRONIC GASTRIC CATARRH.

Chronic gastritis, chronic gastric catarrh, chronic dyspepsia, is a disorder of the stomach characterized by certain structural alterations in the gastric mucous membrane and by weakness

of the muscular coats of the stomach, giving rise to increased flow of gastric mucus, changes in the gastric juices, and feebleness of the digestive movements, resulting in derangements of appetite, digestion and nutrition, uneasiness and tenderness in the epigastrium, slight fever, and general physical and mental depression.

Ætiology.—Chronic gastric catarrh is an affection, chiefly, of middle age (from forty to sixty years of age); it occurs somewhat more frequently in men than in women, predisposition and inherited tendency playing an important part. Conditions which cause the acute form of gastric catarrh may also give rise to the chronic form, and many cases of the latter result directly from imperfect recovery from acute gastritis. Whatever weakens the integrity of the stomach must be considered a predisposing cause.

Among the exciting causes the most prolific are: errors of diet, either excessive eating or the use of unsuitable articles of diet; improper mastication of food from hurried eating or from bad teeth; drinking too freely at the table, especially ice-water; the excessive use of spices, tea, coffee, intemperate use of tobacco or alcoholic drinks; the long-continued exhibition of certain drugs (arsenic, iron, cubebs, mercury) irritates the stomach and is productive of gastritis. The affection occurs in connection with organic disease of the stomach (ulceration, cancer), wasting diseases (as phthisis) and affections which disturb the portal and abdominal circulation (diseases of the liver, especially cirrhosis); also in gout, albuminuria, chronic heart-disease, anæmia, chlorosis.

Morbid Anatomy.—The gastric mucous membrane undergoes histological changes which show “the picture of a parenchymatous and interstitial inflammation. The gland cells are in part eroded or show cloudy glandular swelling or atrophy. The distinction between the principal and marginal cells cannot be recognized, and in many places, particularly in the pyloric region, the tubes have lost their regular form and show in many places an atypical branching like the finger of a glove. Individual glands are cut off toward the fundus, but appear at the border of the submucosa as cysts, partly empty, with a smooth membrane, partly filled with remnants of hyaline and refractile epithelium. An abundant small-celled infiltration

presses against the tubules and is particularly marked toward the surface of the mucosa, and from the sub-mucosa extensions of the connective tissue may be seen passing between the glands. The mucoid transformation of the cells of the tubules is a striking feature in the process, and may extend to the very fundus of the glands" (Ewald). Atrophy of the glandular structure and of the mucous membrane itself (sclerotic gastritis) may take place, one form (phthisis ventriculi) with thinning, the other (cirrhosis ventriculi) with great thickening, of the coats of the stomach. In the former the size of the stomach is not materially affected, while in the latter it is much reduced.

Symptoms.—The symptoms are those of indigestion, with sense of fulness and oppression soon after eating, occasionally severe enough to be designated a "pain." Sometimes a similar distress is experienced when the stomach is empty. Bloating in the epigastric region results from retarded digestion, which is due to lack of muscular energy of the stomach and alkalinity of the gastric juices; the gas thus formed causes distress, eructations of gas, followed by temporary relief, nausea, and even vomiting. With these eructations of gas, mouthfuls of partly digested food may be brought up, and watery, sour, rancid fluid, so irritating as to give rise to a severe burning pain in the substernal region (heartburn). The degree of pain experienced varies from a vague distressing sensation and fulness or soreness to touch to, occasionally, intense suffering. It is often associated with a sense of emptiness, of extreme "goneness" or faintness at the stomach. Vomiting in the average case is not persistent, but is quite common an hour, or two, after eating. Sometimes it recurs with considerable regularity every few days. In patients suffering from chronic alcoholism, phthisis or albuminuria it is frequent and annoying, the ejected matter consisting of stringy, glairy mucus in large amounts, often with an admixture of blood. In common cases the vomited matter consists of food in various stages of digestion, and slimy mucus, hydrochloric acid being present in abnormally small quantity. The appetite is fitful, unreliable; the patient may eat a few mouthfuls or nothing, or he may take food freely and suffer correspondingly. The tongue is large, flabby, coated white and shows the indentations from the teeth; or it

may be red, with prominent papillæ and pointed tip; or, if "bilious," of brownish-yellow. The breath is offensive, and there is much complaint of foul taste in the mouth. Catarrh of the pharynx, with tough, tenacious, foul mucus in the throat and hacking cough, is common. The bowels, usually, are constipated, and the patient suffers from flatulency, colic, dull headache and hæmorrhoidal troubles; in other cases, diarrhœa of a watery character and much flatulency prevails. The urine is alkaline, often cloudy when first voided, iridescent upon standing; its specific gravity is increased, and there is a heavy sediment of urates; oxalates and earthy phosphates are also present. Jaundice may result from duodenal catarrh. Malnutrition eventually results, giving rise to physical weakness, mental depression, peevishness and irritability. The pulse is slow and regular, except as the action of the heart is disturbed by the gastric flatulency. There is dull, heavy headache, sometimes with dizziness. Occasional periods of slight feverish excitement are noted in some cases; the sleep is uneasy, disturbed, or heavy and unrefreshing. The skin becomes dry, wrinkled, and there may be eczema.

When there is extensive atrophy of the gastric mucous membrane, the symptoms may be sufficiently severe to suggest cancer; if cirrhosis exists, it is probable that the tumor can be felt.

Diagnosis.—*Atonic dyspepsia* at times bears a close resemblance to chronic gastritis; there is, however, much less soreness and tenderness in the epigastrium, no fever, the tongue is large and flabby, never of a character indicating inflammatory action, and there are generally manifestations of a neurotic condition. *Cancer of the stomach* is distinguished chiefly by the intensity of the pain experienced, which is also more continuous, if not constant and circumscribed. The vomitus in cancer contains a free admixture of blood. The loss of flesh is noticeably rapid and the expressions of the cachexia are marked. The recognition of a tumor establishes the diagnosis. Aggravated cases of chronic gastritis may closely resemble cancer, especially cases where there is extensive atrophy of the gastric mucous membrane.

Treatment.—The diet must be nourishing and easily digested. Special directions must be given to insure thorough mastication.

tion and leisure in eating. Farinaceous substances and fats are to be largely eliminated, since they favor fermentative processes. Eggs, very lightly cooked; tender, rare meat, especially mutton and beef; oysters; rice and stale, white bread, usually agree. Cream and fresh butter may be used in moderation. A cup of hot meat-broth before a meal is grateful and acts as a gentle stimulant to the gastric mucous membrane. Tea and coffee must be used sparingly, if at all, and must be taken weak and without sweetening.

The use of pepsin and other enzymes and digestants is not often of much benefit. Pepsin should not be prescribed in combination with bicarbonate of soda or other alkali; a combination with dilute hydrochloric acid is preferable. Pancreatin may prove useful if, for some good reason, farinaceous substances cannot be wholly eliminated from the dietary. It is, however, safe to assert that the indicated remedy is far more capable of correcting the conditions for the control of which these enzymes are so constantly and freely exhibited.

Lavage has been considered of the greatest value in all forms of gastritis, but especially in cases which are characterized by the presence in the stomach of large amounts of mucus. It thoroughly cleanses the stomach of the thick alkaline mucus which so strongly favors fermentation, and it stimulates glandular activity. Sterilized water, blood-warm, plain or medicated (sodium bicarbonate and chloride, a teaspoonful to the pint of water; antizymotics if fermentative processes are going on) should be used daily, preferably an hour before breakfast, the washing to be continued until the fluid returns clear and free from mucus and until the stomach has been entirely emptied. Ewald is very earnest in his praise of the results of this treatment, and is strongly indorsed by eminent clinicians. It is, however, a serious mistake to look upon it as universally indicated or useful. To many patients the treatment is exceedingly trying, and the results in general practice often fall short of accomplishing what there is claimed for it. "The apparatus that fulfills all the requirements for lavage consists of a fair-sized, well-fenestrated soft rubber-tube, either of black or red gum, and a hard-rubber funnel. This should be preferred to more complicated and expensive apparatus, or to hard-rubber stomach-tube used with the pump, the employ-

ment of which possesses no distinct advantage over siphonage with the soft tube, and even in the hands of the physician is not unattended with danger. The soft, red rubber-tube, the consistence of which is somewhat firmer than that of the pure (black) gum tube, is a trifle more convenient to introduce, as its ingestion can be accomplished without efforts at swallowing, and for that reason is preferable to the tube of pure gum. Either of these forms of tube may be employed. It must be of sufficient length for the intragastric extremity to reach the most dependent part of the stomach, and the external portion to extend several feet below the stomach level, to permit of ready siphonage. The wash-water should be introduced warm. The quantity used must be accurately noted, that all is withdrawn before removal of the tube. The water should be poured gently into the funnel. The latter must be held slightly above the head of the patient, who may be either seated or standing. After a pint, or more, of water has continuously passed through the funnel and while the latter still contains sufficient to prevent the ingress of air with the fluid, the tube is tightly pinched between the fingers and the funnel is lowered to several feet below the stomach level, and the contents siphoned off by slightly inclining the former, so that an outflow will occur without a coincident entrance of air into the tube, which would check the action of the siphon. Water should then repeatedly be introduced and removed until it returns clear and free from suspended particles of mucus and food. If decided gastric catarrh exists, alkalies may be added to the wash-water. When fermentative processes are active, a pint or so of the last wash-water introduced should contain small quantities of a mild antiseptic, such as sodium borate, sulphite or salicylate; boric acid, the solubility of which is increased by sodium borate, may be used; or, if preferred, naphthaline, resorcin, benzoic acid, potassium permanganate, or any one of the many other antiseptic substances in common use, may be resorted to." (Hare.)

The remedies to be consulted are those discussed under Acute Gastric Catarrh and Atonic Dyspepsia.

NEUROSES OF THE STOMACH.

Gastralgia, Gastrodynia, "Cramps at the Stomach," is an affection of the stomach chiefly characterized by severe pain at the epigastrium, often recurring in paroxysms; it may be a local expression of general nervous irritability from weakness or a true neuralgia of the nerves of the stomach.

Ætiology.—The chief causes of gastralgia are an inherited predisposition and conditions which develop a neuropathic tendency. Whatever exhausts the system increases this tendency. Hard work under unfavorable surroundings and with insufficient nourishment; the long continued pressure of great responsibilities in persons of feeble strength or of a fretful disposition, particularly when coupled with close confinement to counting-room or house; the wear-and-tear of a life of continuous dissipation; the excessive use of tobacco and alcohol; the steady grind of the small worries of life, grief, jealousies and constant disappointments in trifling affairs quite as much as in matters of real moment, all these lower vitality, irritate an already feeble nervous organization, and give rise, directly or indirectly, to this painful affection. Hence it is that the majority of sufferers from gastralgia are anæmic, irritable, anxious, fretful women, often the victims of uterine disease, chiefly at the menopause, perhaps brunettes oftener than blondes. However, men are not exempt from the disease. Gastralgia is also seen as a feature of general neurasthenia and may be caused by chronic malarial poisoning.

Symptoms.—The most important symptom is pain at the epigastrium, at times preceded by faintness and nausea, but often setting in without previous warning. The pain generally is severe, of a shooting, boring, burning, "cramp-like," character, pressive, often radiating into the chest and passing toward the back around the lower ribs. It may be almost unbearable, and is then accompanied with coldness of the extremities, profuse cold sweat, irregular pulse, and a drawn, haggard, even hippocratic countenance. Light pressure usually aggravates, and deep pressure frequently relieves. The pain may be continuous; more often it is paroxysmal, with periods of rest be-

tween the spasms. Relief is sometimes, but not always, had from eating. The attacks may disappear suddenly or with copious eructations of gas, water and mucus, followed by a sense of relief, free voiding of pale limpid urine, and general relaxation.

Vomiting is observed in many cases, but is rarely persistent or severe. The appetite is usually good, save while the patient is suffering from an acute attack. Perversions of appetite are common, here as in other neurotic states, and in the pronounced hysterical cases there are found all the irrational desires for unwholesome substances, such as chalk, pencils, powdered brick, etc., which belong to hysteria. Bulimia is also noted in exceptional cases.

The constitutional symptoms are those of a weakened, irritated, hysterical or neurotic state, including a tendency to neuralgia in various parts, unrefreshing sleep or sleeplessness, capricious disposition and general physical wretchedness. In other cases the patient enjoys fair health and may even have the appearance of one possessed of a vigorous, rugged constitution.

Diagnosis.—The diagnosis depends largely upon the history of the case and the presence of neuralgia or other constitutional expressions of a neurosis. The exclusion of *organic disease of the stomach* (cancer, ulcer) is not always easy, for these are characterized by paroxysms of severe pain in the stomach closely resembling gastralgia, in the case of gastric ulcer including even periodicity of the paroxysms. In cardialgia there is relief from heavy pressure and often from eating; in organic disease there is aggravation from deep pressure and from eating. In the former, vomiting is rarely pronounced; in the latter it is persistent and painful. In gastralgia, the paroxysms having ceased, the patient usually can eat anything he likes; in the organic diseases he must be constantly on his guard, for slight indiscretions may give rise to violent suffering; furthermore, the tongue is red, when there is inflammatory action, and the course of the disease is progressively down-hill, tending toward a well-defined cachexia. Vomiting of blood is very unusual in gastralgia, but is common in gastric cancer or ulcer.

Treatment.—The successful treatment of gastralgia involves

strict attention to the general condition of the patient rather than to the local symptoms. Search for the primary cause usually opens the way to the intelligent treatment of the patient, which in many cases is psychical rather than physical or medicinal. The removal of all causes of irritation; the establishment of regular habits and the use of proper and sustaining diet; healthful and congenial employment; life out-of-doors; systematic exercise in the open air; sometimes a change of residence—all these are of importance.

To relieve the paroxysms of intense pain, copious draughts of hot water, hot fomentations over the epigastric region, sometimes the application of mustard stirred in white-of-egg, are helpful. The use of anodynes, especially injections of morphine, is dangerous; Hoffman's Anodyne or small doses of chloroform, from ten to twenty drops, is less liable to do harm and frequently comforts the patient. For therapeutic hints see the list of remedies at the end of this chapter.

Nervous Dyspepsia.—A functional disorder of the stomach, characterized by gastric uneasiness and pain resembling that of acute gastric catarrh. It is accompanied with general nervous depression and irritability, without real disturbance of the physiological process of digestion.

The chief predisposing cause lies in a neurotic condition of the system, inherited or acquired. The exciting causes are conditions which in other cases might give rise to gastralgia or motor disturbances of the stomach. The influence of the mind upon physiological processes is more fully illustrated here than in almost any other abnormal state of the nervous system. While the patient nearly always complains of gastric uneasiness and even pain after eating, often with fulness and eructations of gas, and at times really suffers severely, this is especially marked when he anticipates harm from eating, either on general principles or because he fancies that the food of which he is expected to partake does not agree with him; and he is rarely disappointed. On the other hand, if under the stimulus of some special excitement the stomach happens to be forgotten, the same person will eat a generous dinner and not suffer the slightest inconvenience. As Struempell remarks, sensitive persons are affected by the slightest psychical influences, and of all such, the most harmful is disquietude with regard to their

own bodily condition. "The fear that a dish they have eaten may harm them, the constant dread that a serious disease of the stomach is in process of development,—such mental disquietude is it which is best calculated to maintain the unhealthy state and gradually to aggravate it. In this way a peculiar subjective hyperæsthesia is developed which feels exquisite "pain" in the stomach when there is really nothing more than the ordinary normal sensation. And, in conclusion, there are developed in the same way certain half-unconscious, half-voluntary movements which produce eructations, vomiting and the like. What we desire, therefore, to especially emphasize is our own conviction that in the large majority of cases of so-called nervous dyspepsia there is no functional derangement of the nerves of the stomach themselves, but a diseased "psychogenous" excitation of the nerve centers, the consequences of which are expressed mainly in the domain of the digestive functions. Nervous dyspepsia is only a particular example of that great class of nervous diseases which owe their origin to hypochondriacal conditions of the mind, and which may occur in the most diverse organs of the body. This explains why the gastric symptoms are frequently attended by other nervous phenomena, among which may be mentioned symptoms of increased psychical irritability, headache, pressure in the head, vertigo and abnormal sensation in the extremities of cold or numbness."

Practically, nervous dyspepsia is hypochondriasis of the stomach, and in spite of the inconvenience and unrest which it brings would not be of serious import were it not that the patient, concentrating his attention upon the stomach, lives in constant apprehension of coming evil, often fancying that some incurable disease has fastened itself upon him; refusing to take proper nourishment, he slowly starves himself and thus continuously increases that exhaustion of the nervous system which in reality is the primary cause of the whole trouble.

The **symptoms** are those of indigestion, moderate and even trifling as to their intensity, but remarkable for their chronicity. There is rarely much pain, but a distressing sensation of fullness in the epigastric region is common, with eructations of gas, sometimes of mouthfuls of food, frequently sour and irritating. Flatulency in some cases is both gastric and intestinal, and

causes inconvenience. Associated with it are palpitation of the heart, fitfulness of sleep, loss of appetite, headache, vertigo, general irritability, emaciation, constipation, and a more or less imposing array of nervous troubles, including coldness, numbness and prickling of the extremities, which usually throw the patient into a perfect agony of apprehension.

Leube describes the following three forms: 1) Nervous dyspepsia with normal secretion, gastric digestion taking place within its proper time-limit, but with discomfort and distress during the act of digestion, pressure, distension, eructations. 2) A form in which there exists a reduction of the normal amount of acidity, the process of digestion here also being performed within the proper time limit. In addition to the general symptoms there are loss of appetite, sleeplessness and gastric distress, and when the stomach is empty there are uneasy local sensations, general feeling of malaise, headache and dizziness. 3) A form in which there is hyperacidity of the gastric juices, the percentage of acid being sometimes doubled. Digestion in these cases is liable to be retarded, especially of farinaceous foods, and burning eructations and vomiting, with considerable distress, are among its most prominent symptoms. This condition at times occurs in paroxysms, usually at long intervals, and is described by Rossbach under the term "gastroxynsis." It is rare, and when seen occurs usually as a symptom of profound neurasthenia or with locomotor ataxia.

Treatment.—The treatment of nervous dyspepsia must be largely aimed at the constitutional state back of it. The Weir-Mitchell method is said to be, and should be, very helpful in such cases. If there is hyperacidity, a farinaceous diet must be prohibited, and meat, raw or rare, substituted. Excessive flatulency invariably indicates restriction in starchy, fat and sweet foods; when associated with a tendency to constipation, it not infrequently finds relief by copious flooding of the colon just before retiring.

Of course, the management of a patient's diet in such cases tries the skill of any physician, and it is sometimes practically impossible to change the notions of the patient as to what he should, or should not, eat, and to enforce obedience. This class of people usually read everything within reach concerning foods and insist upon making of themselves labora-

tories for the benefit of the manufacturers of special food-preparations. It is well to humor the patient so far as is consistent with his interests, and by an abundance of exercise in the open air, baths, occasional change of faces and scenery, by providing wholesome amusement and employment, to build up his general health and to draw his attention from his stomach, impressing him with the probability of eventual recovery by overcoming the constitutional tendency at the bottom of all his troubles.

Nervous vomiting occurs chiefly in hysterical women, especially in brunettes. No lesion of the stomach can here be discovered; it is therefore assumed that the vomiting is due to nervous influences exerted upon the centres presiding over the act of vomiting. The distinguishing feature of the act itself lies in absence of preliminary nausea and of retching; neither do the muscles of the abdomen and chest appear to participate, for the act itself resembles large eructations rather than vomiting. The vomiting in the majority of instances occurs after eating, but not necessarily so; it may come on at any time in paroxysms and at irregular intervals. In some aggravated cases paroxysms of gastralgia have been observed, with much prostration and general upsetting of the nervous system. However, in the large number of instances the general health remains good. Struempell includes under this head the vomiting after every meal from which school children of both sexes occasionally suffer.

The similarity of the paroxysms described as "periodical vomiting with paroxysms of gastralgia" to the gastric crises of *tabes dorsalis* is recognized by writers and clinicians.

Treatment consists chiefly of the persevering employment of the same agencies, principally of a moral character, which are so important in all neuroses. The improvement in the general health and the modification and amelioration of the neurotic condition *per se* is the first thing to be attained, and whatever brings about the latter must of necessity exert a favorable effect upon the former. Sponging and bathing in cool water has a desirable tonic effect; it is especially useful in the case of children of a nervous, irritable disposition who suffer from this cause.

Peristaltic unrest is a term used to describe an irritable con-

dition of the motor nerves of the stomach or of the corresponding nerve centers. This condition was carefully studied by Kuessmaul. It occurs in connection with neurasthenia, and consists of an increased peristalsis of the stomach, in some cases also involving the intestines, with distinctly audible gurgling sounds, heard at some distance, in the stomach and bowels, and borborygmi. Exceptionally this peristaltic action has been reversed and "colored enemata and even scybala have been discharged from the mouth."

Other forms of gastric neuroses have been described, but are of slight, if any, interest to the general practitioner. Of these the most important is *rumination* of food, in which the food is regurgitated and chewed like a cud. It is sometimes hereditary, and is seen in hysterics, epileptics and idiots. It has no noticeable effect upon the health.

Treatment of the Neuroses.—Electricity, it is claimed by electro-therapeutists, has been employed with satisfactory results. Thus, in the treatment of gastralgia, Rockwell places much confidence in the use of the faradic current of high tension in cases where from pressure over the seat of pain relief is afforded; galvanism, when pressure increases the pain. "In using the galvanic current I prefer electrodes of plastic sculptor's clay, placing the anode over the seat of pain. In this way currents of 20 to 25 milliampères are readily borne." In atony of the stomach the same authority places electricity in the front rank of our therapeutic resources, recommending a faradic current of rapid interruption and high tension, used generally and locally. The electrodes chosen should be large and the pole over the region of the stomach should be kept in constant motion to avoid painful muscular contractions. In spasm of the stomach the faradic current should be used, "large electrode being applied a little to the left of the spinous processes and at a level with the cardiac end of the stomach. The other electrode, by preference the cathode, is applied successively with constant movement over the entire surface of the gastric region."

Therapeutics.—In Gastralgia the following are especially useful: PHOSPHORUS, PLUMBUM, BELLADONNA, NUX VOMICA, ARGENTUM NITRICUM, STANNUM, IGNATIA, BRYONIA, FERRUM, BISMUTH, ARSENIC, CHINA, DIOSCOREA, PULSATILLA, PETROLEUM.

Consult also: ASA FŒTIDA, CALCAREA, CARBO VEGETABILIS, CHELIDONIUM, CHAMOMILLA, COLOCYNTHIS, GELSEMIUM, LEPTANDRA, LYCOPODIUM, IRIS, LOBELIA, ÆSCULUS, SILICA.

In Nervous Dyspepsia: NUX VOMICA, IGNATIA, PHOSPHORUS, CALCAREA, BRYONIA, CARBO VEGETABILIS, HYDRASTIS, ARSENIC, ARGENTUM NITRICUM, CHINA, PULSATILLA, ANACARDIUM, ASA FŒTIDA, AURUM, BERBERIS, BISMUTH, IPECACUANHA, IRIS, KALI CARBONICUM, LACHESIS, LEPTANDRA, LYCOPODIUM, MERCURY, NUX MOSCHATA, SEPIA.

Consult also: ARNICA, ÆSCULUS, ALUMINA, CINA, MAGNESIA MURIATICA, AGARICUS, ANTIMONIUM CRUDUM, DIOSCOREA, and the MINERAL ACIDS.

In Nervous Vomiting: IGNATIA, NUX VOM., PULSATILLA, CHINA, ASA FŒTIDA, IPECACUANHA, LACHESIS, LYCOPODIUM, NUX MOSCHATA.

In the motor neuroses: NUX VOM., STRYCHNIA, IGNATIA, ASA FŒTIDA, PHOSPHORUS, GELSEMIUM, PLUMBUM, LYCOPODIUM.

ANACARDIUM. Excessive weakness and irritability of the nervous system from long-continued and excessive mental effort. Wants to eat at all times, because of faintness and goneness, but finds no relief from it. Twitching of muscles. Melancholia and hypochondriasis, with weakness of memory. Digging, throbbing headache, better from eating, worse from thinking. Paralytic weakness in the legs, especially in the knees, so he is scarcely able to walk. Eczema, with excessive itching and burning.—ARGENTUM NITRICUM. Gnawing, ulcerative, sore pain, with sensitiveness to slight pressure, confined to a small spot between the xyphoid cartilage and the umbilicus, radiating to the back, shoulders, hypochondria. Great flatulency; the stomach seems ready to burst; copious, violent eructations, accomplished only after persistent effort. Nausea, with palpitation. Severe pain at the epigastrium, as from a stone in the stomach, with painful, ineffectual attempts to eructate. The pain increases and decreases gradually; when at its height, relief from making violent pressure with the clenched fist in the pit of the stomach. Great mental depression, anxiety, worry. Tremulous weakness of the whole body. Nervous affections resulting from alcoholic or sexual excesses.—ARSENICUM. Of particular value if the history of the case is one of previously existing gastric catarrh, especially from the unwise use of ice-

cold drinks or tobacco. General exhaustion of the nervous system. Great irritability of the stomach; it refuses food and drink. Heartburn. Gulping-up of acrid fluid, excoriating the throat; fulness and tenderness to pressure in the epigastric region. Constrictive pain in the stomach when empty. Nausea and vomiting, better from taking hot drinks, especially milk. Violent burning pain in the stomach. Attacks of sudden weakness. Characteristic thirst, restlessness, anxiety. Coldness of the skin. Anæmia. Rapid exhaustion. Although of particular value in acute catarrh of the stomach, it is very useful in gastralgia when the patient becomes exhausted rapidly and the general characteristics of the remedy are present.—**ASA FŒTIDA**. Excessive gastric and intestinal flatulency, with distension, in nervous, hysterical women. She cannot relieve herself of the flatulency; it refuses to pass downward, and must be brought up from the stomach. Physical and mental hypersensitiveness. Craving for wine. Globus hystericus. Regurgitation of food. "It seems as if the peristaltic action of the bowels were reversed." (T. F. Allen.)—**AURUM**. Flatulency with pain at the heart and palpitation. Burning and pressure in the stomach, with hot rising. Relief of gastric pain and palpitation by eructations of gas. Profound melancholy with weeping and crying.—**BELLADONNA**. Gastralgia. Gnawing, pressing pain, or wrenching pain extending to the spine, or spasmodic tension which makes the patient bend backward or stop breathing, which seems to afford some relief. Tired feeling in the spine; attempts to rest the spine by bending backward; pain excessive, hardly endurable. Acuteness of all the senses. Impatient, demonstrative, and intolerant of pain. Extreme tenderness in the epigastrium. He cannot bear the slightest touch, pressure or jar.—**BERBERIS**. Nervous dyspepsia. The patient is melancholic, listless, depressed. Prostration so great that he sweats freely from the slightest motion. Bilious tendency. Offensive, metallic odor from the mouth, which is dry and sticky. Eructations, heartburn, vomiting of food after eating.—**BISMUTH**. Gastralgia. Burning and pressure in the stomach after eating. Pain confined to one small spot, with sense of heaviness as from a load, forcing him to bend backward. Sweet, metallic taste in the mouth; thirst for cold drinks, which are promptly rejected. Intense malaise, with burning

pain in the spine, forcing him to bend backward. Waterbrash; flatulence; prostration. "While taking cold drinks, there is relief; yet, when the stomach becomes full, there is vomiting of enormous quantities."—*BRYONIA*. Pressure in the stomach from indiscretions in diet; it comes on when the stomach is empty or full; pressure as of a heavy stone, continuing for several hours and passing off with copious eructations. Sour risings, heartburn, vomiting of sour, acrid mucus. Sensitiveness of the stomach to external pressure; craving for coffee, wine, acids. Yellow coating of the tongue. Bitter taste in the mouth. Stitches in the stomach. Contractive, pinching pain in the stomach, relieved by eructations. All the symptoms are worse from motion. Tongue coated heavy, white. Great sensitiveness in the epigastrium to touch. Vomiting of food.—*CALCAREA CARBONICA*. Of use chiefly in chronic cases of nervous dyspepsia in fagged-out house-wives of characteristic temperament and with the constitutional indications of the remedy. Tongue coated thick, whitish-yellow. Loss of appetite. Positive disgust for meat and warm food; prefers all food cold. Bitter, putrid, sour taste. Bloating and fulness after eating. Sensitiveness at the pit of the stomach. Palpitation of the heart from weakness. Profuse accumulation of saliva in the mouth, appearing to relieve the stomach symptoms for a time. Malnutrition with sluggishness, profuse sweating, coldness of the extremities, inability to bear an exertion. Sometimes ravenous hunger and thirst, with longing for eggs and indigestible substances. Acidity of the stomach; everything he eats turns sour; sour risings; heartburn; sleeplessness.—*CARBO VEGETABILIS*. Useful in cases of nervous dyspepsia of persons who have been high livers. Flatulency; sour, rancid eructations, with much soreness in the epigastrium. Aversion to food, with occasional violent spasmodic contractions in the epigastrium, worse at night, better from eructations. Nausea, not often vomiting, relieved temporarily by taking an alcoholic stimulant or strong coffee. Sense of trembling and of heavy weight in the stomach. Cannot bear milk, meat or fats of any kind. Stomach swollen like a drum. Inertia of the stomach; cannot digest anything, no matter how simple. Coldness of the surface of the body, with feeble pulse. Often very useful in the gastralgia of nursing women, with excessive flatulence, sour

and rancid belching, vomiting of food. Resembles BISMUTH in that the epigastric pain and burning often extends into the spine.—CHINA. In anæmic and malarial conditions. Acidity; “goneness” and faintness at the stomach, better from eating, but only for a short time. Coldness in the stomach. Craving for stimulants and pungent, refreshing things; cannot eat farinaceous food; slowness of digestion, with cramps and pressure after eating; vomiting of ingesta; ill humor; indisposition to make an exertion. After eating he is obliged to lie down and rest; cannot work.—DIOSCOREA. Acts powerfully upon the coeliac and umbilical plexus; useful in persons with weak digestion and tendency to colic. Burning at the stomach, with sharp pricking pain and faintness. Belching of large quantities of gas. Pains radiate in all directions and appear constantly in the head and feet. Said to be very helpful to persons suffering from the excessive use of tea. “Neuralgia of the stomach, most severe pain even along the sternum and extending into both arms, with cold, clammy sweat, etc.”—FERRUM. In anæmic persons, subject to neuralgia and disturbance at the heart. Nervous dyspepsia. Heavy pressure at the pit of the stomach. Vomiting immediately after eating, without nausea; brought on by moderate exertion. Intolerance of milk. Pain better from vomiting. Weak and restless; must keep on the move, yet is greatly exhausted by it. Intolerance of pain. Though anæmic, the face flushes scarlet from slight emotion or without cause. Extremities cold. Ravenous hunger or disgust of food. Diarrhœa after eating.—HYDRASTIS. Weak digestion, with heavy, hard, thumping pain; fulness of the chest; dyspnœa; empty, gone, faint feeling at the stomach; pulsations at the pit of the stomach; palpitation at the heart; sour and bitter eructations; pyrosis; aggravations from eating; large, flabby tongue, looking as though covered with slime. Tendency to catarrh and ulceration of the mucous membrane, debility and constipation. Nervous dyspepsia of old people.—IGNATIA. Great nervous prostration and irritability. Loss of appetite; musty eructations; bloating after meals, with hic-cough from eating or drinking. Fair appetite, but a few mouthfuls of food satisfy him; he cannot eat a full meal. Faintness, emptiness, goneness at the stomach. Flatulency and colic, especially at night. Oppressed, sighing breathing, with palpi-

tation of the heart. Periodical cramps at the stomach, occasionally with canine hunger and qualmsiness. Absolute anorexia, with aggravation of constitutional weakness from the lack of proper food. Sense of pressure, as from a stone, in the pyloric region. Gnawing, cutting pain; sensitiveness in the pit of the stomach. Of great value in stomach troubles of habitual smokers. Characteristic despondency and hysterical excitement.—**IPECACUANHA**. Useful when there is constant nausea with tendency to vomit and aversion to all food, due to nervous influence rather than gastric irritation.—**IRIS VERSICOLOR**. Although more directly indicated in gastric catarrh than in the neuroses, it yet holds an important part in the treatment of the latter when the symptoms are of unusual violence and border upon the inflammatory. There is great burning distress in the stomach; vomiting of sour food and acrid, watery substances; belching of gas and great heartburn. Bilious symptoms; bilious vomiting; bilious diarrhoea; acridity of all discharges and burning, smarting in the parts over which they pass.—**KALI CARBONICUM**. In old people "who are constantly chilly, never perspire, have pallor of the face, œdema of the upper eye-lids, great desire for sweet things, bloatedness of the abdomen, dryness of the mucous surfaces, dry hard stool, turbid urine." Bloating; sour eructations; heartburn; feeling of weakness or of a lump in the pit of the stomach. Attacks of gastralgia, with sharp cutting, stitching pain, from drinking ice-water.—**LACHEISIS**. Indicated by excessive soreness at the stomach to touch, with intolerance to slightest touch or pressure, even from the bed-clothing. Perceptible trembling in the epigastric region; foul cadaverous taste.—**LEPTANDRA**. Useful in exceptional cases when a bilious state prevails, characterized by flat, pappy taste and black, fetid, tar-like copious stools. Nausea, with death-like faintness upon rising. Great gastric and hepatic distress, worse from drinking water.—**LYCOPodium**. In chronic cases of nervous dyspepsia and gastralgia, with immense distension of stomach and intestines from gas. Ravenous hunger, but he bloats at once and cannot eat on account of it; or sense of extreme fulness even before eating, so he cannot take food. Acid dyspepsia. Eating solid food increases all the symptoms. Extreme flatulence in chronic cases is the most characteristic indication.

Great exhaustion; brick-dust sediment in the urine.—**MERCURIUS**. In chronic cases of moderate severity and with liver complications. Foul, sweet, brassy, saltish, bitter taste in the mouth, especially in the morning. Wants spices, highly seasoned foods, cold drinks, alcoholic stimulants. Slimy mouth. Suspicious, vehement disposition.—**NUX MOSCHATA**. In hysterical women. Great flatulency, brought on by any excitement as quickly as by eating. Natural appetite, but satisfied by a few mouthfuls of food. Faintness; enormous bloating at the stomach. Mental efforts aggravate all the symptoms.—**NUX VOMICA**. Most useful in cases of nervous irritability and exhaustion from overwork, especially of a sedentary character, the immediate attack often provoked by imprudence at the table. Cross; easily irritated; gets angry at trifles and tolerates no interference or contradiction. Sallow complexion. Dull, frontal headache, especially in the morning; inability to make a prolonged mental effort; constipation. Fulness and distension after a meal; sensitiveness to pressure; tightness about the waist; lassitude, nausea, vomiting of bile and food. Bitter, sour, insipid taste. Cannot eat bread, milk or acids. Usually aggravations from eating. Heartburn. Desire for stimulants. Pain in the stomach as though it were knotted up. Persistent efforts to vomit food. In gastralgia; the stomach makes spasmodic contractions upon the food; light pressure affords relief. In case of habitual users of alcoholic stimulants and strong drugs.—**PETROLEUM**. Emptiness and weakness at the stomach. Water-brash. Drawing, pressing pain at the stomach. Constant nausea. Nausea with accumulation of water in the mouth. The persistency of the nausea and the temporary relief which is regularly experienced from eating are the symptoms most characteristic of this remedy.—**PHOSPHORUS**. The gastric trouble is the result of general exhaustion of the nervous system from fast living, especially sexual excesses. Alike useful in nervous dyspepsia and gastralgia. Great prostration; dryness of the throat and of the tongue; sour taste. Regurgitation of food; burning pain in the stomach, with thirst for cold drinks, which are ejected as soon as they become warm in the stomach. Constant loud rumbling of gas in the stomach, with eructations of gas, which afford only slight relief and do not appear to lessen the flatulency.

Oppression of the chest, proceeding from the stomach and worse after eating. Burning, gnawing pain in a circumscribed spot in the stomach, which is very sensitive to the slightest pressure. This pain extends directly backward to the spine, is made worse from motion and eating, better from rest and, for a short time, by cold drink. Faintness, emptiness, gnawing at the stomach, relieved temporarily by eating. Vomiting of the entire contents of the stomach, sometimes with an admixture of blood.—**PLUMBUM.** Gastralgia; the paroxysms are violent in character and come on very suddenly. The pain compels the patient to bend backward; it is relieved by deep, hard pressure and by eructations. The entire abdomen draws in and feels hard and tense like a board. Sensation as if the abdominal walls were drawn far in and were touching the spine. Periodic vomiting of food, or of brown, dark liquid, accompanied with severe cramps.—**PULSATILLA.** Nervous dyspepsia; tongue coated thick, with whitish, rough fur; taste sticky, pasty, as from spoiled milk; repugnance to warm dishes; absence of thirst. Digestion exceedingly slow; he continues to taste the food long after it has been swallowed; regurgitation of food for a long time after eating; pain in the stomach beginning an hour, or more, after eating. Hiccough; rumbling in the bowels. Feeling as if a lump had lodged in the gullet. Gnawing sensation in the stomach when empty. Sour and bitter eructations and vomiting. Indigestion easily brought on by eating rich pastry, fats, buckwheat cakes, or drinking ice-water. Gastralgia, with similar symptoms and profuse sweating of the face.—**SEPIA.** In women who suffer from menstrual or uterine difficulties. Sour, putrid taste; aversion to meat; desire for sour things; emptiness in the stomach, with anguish; palpitation; weakness and weariness of the legs; sour and putrid eructations. Hypochondria, especially at the climacteric. Amenorrhœa. Aggravation of nausea and vomiting from eating and lying down. Longing for acids. Feeling of something twisting about in the stomach and rising into the throat. The pain comes on gradually, steadily grows worse, then as gradually disappears to return in the same manner. It is very obstinate; relieved by pressure. Sinking, gone feeling at the pit of the stomach; canine hunger; great uneasiness, compelling him to walk about; he soon tires and sits down, but again walks about, impelled

by a feeling of restlessness, with temporary relief from the exercise.—**STANNUM.** The pain is obstinate; it gradually increases and as gradually decreases, getting better and worse gradually. It extends to the navel and is relieved by hard, steady pressure. Sinking, gone feeling at the pit of the stomach; canine hunger; relief from walking, but he is so weak that he is forced to desist soon.

DILATATION OF THE STOMACH.

Dilatation of the stomach, also called gastrectasis or gastrectasia, must be distinguished from magastria, a more than usually large stomach which performs all its functions in a normal manner.

Ætiology.—Acute dilatation of the stomach is exceedingly rare, and is the result of the introduction into the stomach, within a short time, of an inordinately large amount of food or drink. Chronic dilatation is not infrequent, and is due to mechanical obstruction of the pylorus or to atony of the muscular wall of the stomach. Obstruction or narrowing at the pylorus or duodenum in the great majority of cases arises from cicatrization of cancerous ulceration or, less often, simple gastric ulcer; very exceptionally the stricture may be congenital. Violent inflammation of the stomach, involving the deeper structures (phlegmonous or toxic gastritis) may also result in pyloric obstruction from cicatrization. Other causes are: pressure of tumors from within (polypi) or from without (tumors of the pancreas, liver, omentum, floating kidney?), cicatricial bands from an old peritonitis, or a large scrotal hernia, dragging down the transverse colon or the omentum.

Atony of the muscular walls may be so great that the expulsive power of the stomach is wholly inadequate to the task imposed by the digestion of an average meal (absolute atony), or it may prove inefficient only when there is made upon it an unusual demand (relative atony). It may also result from local causes, as a gastritis, or from impaired nutrition of the organ, as an incidental factor in the course of neurasthenia, anæmia, cancer, tuberculosis, or some other grave constitutional disease. Again, the fermentative changes going on in a tedious case of chronic gastritis are in themselves capable of so stretch-

ing the walls of the stomach as to become important factors in producing dilatation. The same, within certain limitations, applies to the persistently large quantities of food and drink consumed by diabetics, excessive beer-drinkers, and the insane.

The greater number of cases are seen in the middle-aged; occasionally instances of dilatation are found in rickety children.

Hypertrophy about the pylorus usually precedes dilatation. This is due to the endeavor on part of the muscular tissues to overcome the difficult propulsion of food out of the stomach.

Symptoms.—The symptoms are those of indigestion, modified by the symptoms of any disease of which the dilatation is an incident. There is disturbed and capricious appetite, gastric uneasiness and discomfort, flatulency and vomiting. The latter is almost characteristic, taking place at irregular intervals which increase as the dilated stomach becomes capable of holding increasing amounts of food and drink. In a well-developed case vomiting may take place only every few days, the quantity then ejected being large, amounting even to several quarts. There sometimes is some retching, but usually the act is accomplished without effort or pain. The vomitus is of dark-grayish appearance, of distinctly sour odor, due to the acids present, and often contains particles of food which were eaten days before. If allowed to stand, three separate layers may be seen. A frothy, brownish layer on top; below this, a muddy, dark-grayish fluid; at the bottom a layer of food. Microscopic examination shows many bacteria and moulds, with yeast fungi and *sarcina ventriculi*; also crystals of fatty acids.

Hydrochloric acid is present in varying amounts; it may be diminished, increased, or wholly absent.

In the progress of the disease very little fluid can escape from the stomach; this accounts for the scantiness of urine, constipation, and great dryness of the skin. The urine is diminished in acidity and often is persistently alkaline. Constipation is present in the great majority of cases, but sometimes there is diarrhœa. Nutrition necessarily becomes bad, and the patient progressively loses strength and at last suffers from extreme emaciation. Depression of spirits, eructation of foul gas from the stomach, headache, dizziness, sleeplessness, with palpitation of the heart and difficult, oppressed breathing, are noted as the case advances.

Kuessmaul has described a form of tetany which is seen in some advanced cases of dilatation, after profuse vomiting or lavage. The spasms are tonic, involve the flexors of the foot, arm, hand, calf, and abdominal muscles; sometimes they are general and continue for a few minutes to a few days.

The most positive symptoms, however, are elicited by various methods of physical examination. By *Inspection*, the patient standing, it is usually possible to determine the outlines of the dilated stomach. There is great enlargement of the abdomen, most conspicuous below the umbilicus. The lesser curvature, which is not so often clearly visible, is distinguished a little below the ensiform cartilage, while the greater curvature can be followed on the left from the tenth rib toward the pubes, then sweeping upward on the right to the costal margin. The peristaltic movements may also be seen, proceeding from left to right, sometimes the reverse. In some cases the stricture itself may be detected, the hypertrophied mass, tumor-like, showing through the thinned abdominal wall. Frerichs advises the administration of a half-drachm each of the bicarbonate of soda and of tartaric acid, one after the other, for the purpose of artificially distending the stomach when making inspection. *Palpation* verifies the peristaltic movements and conveys to the hand a sensation of elastic resistance of the stomach, as from an air-cushion. By striking quick, sharp blows with either hand alternately upon the walls of the stomach, a splashing sound (clapotage) is produced. *Percussion* is comparatively difficult and unsatisfactory, but it is an aid in doubtful cases. It must be practised with the patient in both the erect and recumbent position and when the stomach is full and empty. If the patient is directed to drink about a quart of water when the stomach is empty, and then is made to assume the standing posture, percussion will define the lower boundary of the stomach by establishing a well-defined line of dulness. If this line is below the umbilicus, there is reason to believe that dilatation exists, although we must bear in mind the possibility of dealing with a displacement, downward, of the stomach.

Auscultation yields splashing sounds if a series of sudden, forcible impulses with the hand are given. To render this otherwise unreliable sign of positive value, auscultation should

be practised about two, or more, hours after drinking freely, then removing the water from the stomach by means of a siphon. If, after emptying the stomach, the same splashing sounds are not reproduced, it is safe to consider them of diagnostic value. The heart-sounds, with a dilated stomach, are transmitted with great distinctness and with a metallic quality. *Mensuration* by means of a hard sound introduced into the stomach is of slight practical value.

The diagnosis depends upon clearly establishing the greater curvature of the stomach below the umbilicus, upon the character of the vomitus, and upon such knowledge as can be obtained by means of the stomach pump, showing for how long a time food has been retained in the stomach. The diagnosis is especially difficult in the early stage, when it may be impossible to differentiate between dilatation and a normal, but large, stomach, with a low form of gastritis or atony of the muscular wall.

The prognosis is rather favorable if the affection is detected before dilatation has become large and habitual. Indefinite prolongation of life and great general improvement may be hoped for in the absence of malignant disease or extreme exhaustion. When the local affection is the result of a grave constitutional disease, as tuberculosis, the prognosis cannot be encouraging; when associated with, or dependent upon, malignant processes, it must necessarily be hopeless.

Treatment—Since Kuessmaul first employed *lavage*, it has become the means of affording great relief to otherwise incurable cases by removing from the stomach contents undergoing fermentation, cleansing the organ, and by encouraging it to contract. The operation has been described (see chapter on Chronic Gastric Catarrh). Pure water may be used, or, if fermentative processes are active, a one per cent. solution of salicylic acid, or sodium borate, resorcine, potassium permanganate, or some other antiseptic substance.

Electricity.—Einhorn, Rockwell and others highly recommend electricity. Rockwell cites a case in which remarkable and permanent improvement resulted from the direct application to the stomach of a faradic current of slight tension, applied by means of a bipolar electrode, combined with general faradization. H. G. Piffard places an ordinary faradic appa-

ratus in shunt with the current. Each time the circuit is closed by the rheotome the current will be increased, and diminished each time the circuit is opened. The effect of this rapid fluctuation in the current is to produce muscular contraction resembling that caused by a strong faradic current. This current, internally applied through a stomach electrode, has proved very useful in dilatation of the stomach.

Diet must be carefully regulated, so as to represent a large amount of nourishment in the smallest possible bulk; neither should the food selected ferment readily. To increase the muscular energy of the stomach, *massage* may prove helpful; it also aids in forcing the passage of food from the stomach into the intestine. Hypodermic injections of strychnia are recommended for their tonic effect upon the muscular fibre. Hydrochloric acid, carbolic acid, kreosote, salicylic acid, and others of this class are used to control the fermentative processes.

Surgical measures for the forcible dilatation of pyloric stricture or for the removal of the cicatricial mass have been employed. Occasional brilliant results have been announced, but in the main the mortality has been high.

The nature of this affection is such that internal medication cannot be expected to do more than relieve such special symptoms as may arise from time to time and possibly strengthen the muscular tissues of the stomach. Seutin (Journ. Belge d'Homéopathie) claims to have used the following with good results: ARNICA, ANTIMONIUM CRUDUM, ARSENICUM, BRYONIA, CHAMOMILLA, COCCULUS, CUPRUM, COLOCYNTHIS, GRAPHITES, NUX VOMICA.

NUX VOMICA and STRYCHNIA are undoubtedly the most promising remedies to give tone to the exhausted muscular fibre of the stomach. E. M. Hale says: "I have found the alternation of hydrastis, hydrastine or muriate of hydrastine with nux vomica or strychnine to give better results than any other medicinal treatment."

SIMPLE ULCER OF THE STOMACH.

Simple (peptic, round, rodent, penetrating) ulcer of the stomach occurs in both sexes, nearly twice as often in women as in men. In the former, it is commonest during the third, in men

during the fourth, decade of life. Very young children and people of advanced years are almost exempt. Occupation may have a bearing when it involves possible injury to the stomach, as from long-continued pressure upon it; it is thus that the comparative frequency of the affection among weavers, tailors and shoe-makers is explained. It is oftener seen in anæmic, weak, chlorotic persons than in those of rugged health.

The specific cause of the ulcer has not yet been positively determined. It is, however, generally assumed that it is a case of self-digestion of the stomach (hence, peptic ulcer), involving a limited area whose nutrition has previously been interfered with. Virchow suggests that thrombosis or embolism of a minute blood-vessel thus constitutes the first cause of the ulcer. It has been demonstrated that alkalinity of the blood or hyper-acidity of the gastric juice are frequently occurring features of the disease.

Simple ulcers are known to follow mechanical injuries, burns or a blow upon the stomach; they are also found in connection with heart-disease, circumscribed stasis in the circulation of the stomach, etc. The affection is not always recognized during life; examinations after death constantly reveal the presence of ulcers in the stomach, usually cicatrized, the existence of which had not been suspected.

Simple ulcers may occur in the duodenum, preferably near the pylorus, and are more frequent in men than in women.

Morbid Anatomy.—Peptic ulcer is usually single, but may be multiple, not often more than three or four in number. Notable exceptions have occurred. Berthold records a case in which thirty-four ulcers were counted, and one of Fagge's cases after death showed "that almost the whole of the mucous membrane of the stomach was diseased. There were numerous recent ulcers with raised, irregular edges, and there were also many thickened, puckered cicatrices."

In shape the ulcer is round or oval, sometimes irregular. Its borders are sharply cut, giving it a "punched-out" appearance; the walls slope inward, rendering it funnel-shaped; growing older, the walls become indurated and thickened, and thus lose the sharpness of their outline. The base is usually clean, differing in appearance with the depth of the ulcer. Its size varies greatly. It may not be larger than a small pea, but

more often attains a diameter of one-half to two inches. Peabody reports a case in which the ulcer involved all the lesser curvature and a large portion of the anterior and posterior wall. The favorite position is at the lesser curvature, near the pylorus, on the posterior wall of the stomach; but the anterior wall and the greater curvature may be involved.

The healing of a single ulcer of moderate size and of a superficial character takes place from the edges and floor, the tissues gradually contracting and leaving a smooth scar. Larger ulcers, dipping into the muscular coat, in the process of healing give rise to more or less extensive cicatrization and changes in the shape of the stomach; thus, cicatrization near the pylorus is a frequent cause of stricture at that point and subsequent dilatation of the stomach, while the so-called girdle-ulcer may result in hour-glass contraction of the stomach.

Pepper speaks of the process itself as a necrosis, and not a true ulceration. "The parts surrounding the ulcer are made up of broken-down red blood corpuscles, granular material and cells which stain but poorly, together with fibrine, hyaline masses and scattered red blood cells in the parts a little more removed. As the ulcer grows older, a small-celled infiltration takes place about it, showing a tendency to repair; as healing takes place, fibrous tissue forms in the walls and floor, and, contracting, leaves a smooth, stellate, white scar, with the mucous membrane puckered about it."

Perforation constitutes one of the dangers connected with simple ulcer. Fortunately, when located on the posterior wall, this is often prevented by adhesive peritonitis, by which the stomach is permanently attached to the pancreas or left lobe of the liver, possibly to the transverse colon, diaphragm or spleen. If located on the anterior wall, the possibility of such an adhesion being formed is much less; hence, the danger here is correspondingly greater. If ulceration penetrates the organ to which the stomach has become attached, abscess-formation takes place, and parts of the liver, spleen and pancreas may be destroyed by an intraperitoneal abscess thus formed. Perforation may take place into the pleura, lungs, pericardium or transverse colon; less often into the gall-bladder and left ventricle or through the skin. Perforation directly into the peritoneal cavity usually results in death from shock and peritoni-

tis. An opening through the posterior wall into the lesser peritoneum may cause a subphrenic pyopneumothorax.

Symptoms.—Post mortem examinations constantly reveal the presence of gastric ulcers in cases where during life no symptoms pointing to serious stomach trouble were experienced. Again, a violent hæmorrhage or a fatal perforation may be the first indication of the lesion. In other cases a long history of dyspepsia is rehearsed, without a single symptom especially characteristic of ulcer until some change in the patient's condition suddenly reveals the true nature of the affection.

Pain, tenderness, hæmorrhage and vomiting are the most striking symptoms of gastric ulcers. *Pain* probably is the most constant and characteristic of these. It varies in degree of intensity, from a slight gnawing distress in the stomach when empty, as in the night, greatly relieved by eating, to paroxysms of intense gastralgia. The latter are usually brought on by eating, especially by taking into the stomach sour, very cold or very hot substances. In some cases it occurs within ten or fifteen minutes after eating, in others not for two hours, or even longer. It is usually felt just below the xiphoid cartilage, and often radiates from a small circumscribed spot in that locality to the back and sides. It may be almost unendurable, the sufferer finding some relief from bending forward, often from hard pressure, usually from rest. It may return at the same hour after eating, for days, weeks, even months, and then suddenly disappear for a long time, to recur upon some slight indiscretion in eating or from some aggravation of the local trouble. Symptoms of attendant gastritis are often noticed in connection with it. *Hæmorrhage* occurs in probably more than half of all the cases studied. It varies greatly in quantity, but usually is copious and consists of fresh, bright-red blood. If bleeding is slight, the blood may have undergone changes; but such is the case rarely. Frequently the blood is expelled through the bowels, especially when the ulcer is duodenal, and then its color is dark. Hæmorrhage may take place simultaneously from both stomach and bowels. If the amount of blood lost is large, syncope may result, followed by a temporary cessation of bleeding, to be renewed in the greater number of cases soon after the patient has revived; or death may

occur. These large hæmorrhages at best leave the system much impoverished, and the probability of their recurrence at any time is a source of apprehension. *Tenderness* to touch or pressure is always present, but cannot be considered of equal importance with other symptoms, since many persons in good health are naturally very sensitive to pressure in the epigastric region. However, in cases of gastric ulcer this tenderness is almost always marked, being usually most pronounced at a small spot an inch, or two, below the ensiform cartilage. In examining a patient suspected of ulcer for this condition, great care should be exercised lest firm pressure upon the part result in rupture and perforation at the seat of the ulcer. Nausea and *vomiting* are not always present; but when present, it takes place in about two, possibly three, hours after eating. The vomited matter contains much hydrochloric acid and shows only slight traces of fermentation. In some patients vomiting is very persistent. It is beyond doubt often directly due to the irritation of the ulcer by the food eaten.

With these, there is usually considerable loss of weight; in very bad cases the emaciation may be almost as extreme as in malignant disease. Anæmia is proportionate to the amount of blood lost and to the starvation endured; in women it is likely to be associated with amenorrhœa. Depression of spirits, headache, great despondency, stubborn constipation and a host of minor ailments, due to incidental phases of morbid action, render life miserable.

Perforation is said to occur in $6\frac{1}{2}$ per cent. of all cases, and seems to be more frequent in women than in men. Usually fatal, recoveries nevertheless occur occasionally. It is announced by hard pain in the epigastrium, rapidly extending into the abdomen; but the pain may be referred to some more distant part. Rapidly increasing abdominal distension, with excessive sensitiveness to touch, small rapid pulse, cold sweat, Hippocratic countenance, shallow breathing, and other symptoms of collapse, are followed by death.

The *course* of simple ulcer is chronic, continuing progressively, sometimes with periods of improvement, more or less pronounced, for an indefinite length of time, often for a series of years. Throughout this course various complications may arise, of which the chief are chronic gastric catarrh, chronic

peritonitis, pylephlebitis, parotitis of a septic character, and even cancer. Cirrhosis and dilatation of the stomach may result.

Diagnosis.—It is not difficult to recognize gastric ulcer in the presence of its characteristic symptoms: pain, vomiting, hæmorrhage. In actual practice, however, cases are common in which the train of symptoms renders a diagnosis difficult and even impossible.

Both *gastralgia* and ulcer have points of striking similarity, and symptoms which largely determine the differentiation between them may be of relative rather than positive value. Both have relief of pain from eating, but this is much more pronounced in *gastralgia*, and the very reverse often obtains in ulcer. In *gastralgia* pressure affords relief; in ulcer it aggravates; yet, the patient suffering from ulcer very commonly seeks a position in which he can make hard pressure upon the epigastrium. In *gastralgia*, however, the pain lacks that element of sickening intensity which belongs to ulceration; the cessation of the paroxysm brings with it rest; and the history of the case shows hysterical, neuralgic and neurotic tendencies. In ulcer the pain is of the peculiar agonizing character referred to; the cessation of the paroxysm leaves the patient suffering with dyspepsia and symptoms of gastric catarrh, and there is an absence of neurotic symptoms. Furthermore, in ulceration nutrition is more seriously affected; there is hyperacidity of the gastric juice, and a possibility of detecting the presence of pyloric thickening and evidence of gastric dilatation. If hæmatemesis occurs in connection with intense pain and vomiting, a diagnosis of ulcer of the stomach may usually be made. Intestinal hæmorrhage, with *gastralgia*, is presumptive evidence of duodenal ulcer.

Gall-stone colic is distinguished from gastric ulcer by the suddenness with which the paroxysm of pain appears and disappears, the location of the pain at the right side, the probable enlargement of liver and gallbladder, and possibly jaundice.

Hæmoptysis is distinguished from the hæmorrhage of gastric ulcer in that the history of the case points to some affection of the lungs or heart; the blood is coughed up, and the cough is caused by, or associated with, tickling in the throat; it is sometimes followed by nausea and vomiting from swallowing

blood; the blood is frothy, bright-red, alkaline, sometimes contains small clots and often admixtures of sputa. The hæmorrhagè of ulcer of the stomach may have no history of any previous trouble; the blood is vomited up, and the vomiting usually is preceded by faintness, nausea, and some dizziness; the blood is fresh, bright-red, acid, and often contains small particles of food; quite frequently blood is also passed with the stools.

Treatment.—Absolute rest in bed is essential. German practitioners recommend the application of moist compresses or warm fomentations to the epigastric region.

A proper diet is of the last importance, since the exhausted condition of the patient indicates generous feeding, while yet there is great danger of provoking gastralgia and bleeding from mechanical or chemical irritation of the floor of the ulcer by the introduction of food into the stomach.

Struempell for the first ten days allows nothing but milk, bouillon, and in exceptional cases thoroughly softened bread or egg. The patient doing well, during the next ten days such soft food as brains of calves boiled, sweet-breads, broiled fowl, or flour gruel, are allowed; after ten days more, sirloin or steak, rare and tender, underdone roast veal, game or fish may be given. The diet of the first ten days must be resumed whenever irritability of the stomach threatens to return. Artificial foods may be added to the dietary as dictated by the judgment of the physician.

To overcome the hyperacidity of the gastric juice, the same authority recommends a solution of a tablespoonful of Carlsbad salts in a pint of warm water, to be taken in three or four divided doses during the forenoon and afternoon.

Others advise exclusive feeding per rectum for the first week, or two, giving only a little cool water by the mouth to relieve the thirst. "A single cleansing enema is given once daily; and at six-hours intervals a nutrient enema, six to eight ounces in bulk and composed of one or two raw eggs, an ounce of expressed beef-juice, and fully peptonized milk, is administered. Tolerance by the rectum is promoted by the addition to the enema of a few drops of laudanum. After one or two weeks, small quantities of milk at frequent intervals are given by the mouth, and the rectal alimentation is gradually diminished as that of the

stomach is increased. Pain usually ceases immediately on the cessation of gastric ingestion, and the loss of weight during a fortnight of rectal feeding is surprisingly small."

If nausea and vomiting are excessive, feeding by the stomach must be stopped at once. Lavage often affords relief of this troublesome condition. If pain is excessive, the external use of hot or cold applications or of chloroform may relieve; morphia may have to be given hypodermically, but the great danger here of establishing a "habit" must be borne in mind. E. M. Hale prefers codeine, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Hæmorrhage demands absolute quiet and the greatest care in feeding. Nothing but ice-cold milk, ice-cream and bits of ice should be given by the stomach. Ergotine in two-grain doses is useful. Stimulants are indicated when syncope threatens, but must be given per rectum. Perforation may demand the immediate performance of laparotomy.

Therapeutics.—**ARGENTUM NITRICUM.** Severe pain in a small circumscribed spot just below the xiphoid cartilage, extending to a corresponding point in the spine; pain extending from the stomach into the chest, shoulders, abdomen. Great aggravation from eating or drinking; enlargement and pain in the liver.—**ARSENICUM ALBUM.** Gnawing pain in the stomach, with great tenderness to pressure. Burning pain as from a live coal. Exceeding irritability of the stomach; it retains neither food nor drink; great burning thirst; drinking is followed immediately by vomiting. Pain after eating or drinking, with deathly nausea and vomiting. Great anxiety; fears he will die.—**BISMUTH.** Pressure as from a load in one spot; intractable vomiting; severe pressive, burning pain extending from the stomach through the body to the spine. Relief from cold drinks; when the stomach gets filled, vomiting of very large quantities.—**PHOSPHORUS.** Fainting; cold extremities; severe pressure in the stomach after eating, with immediate vomiting; vomiting after drinking cold water, for which he has an intense craving. Intense gastralgia, as from knives. Burning heat in the stomach, extending to the back, with faint, empty feeling in the stomach and bowels.—**HYDRASTIS.** Great soreness and burning in the stomach; hyperacidity; nausea and empty eructations; faintness, goneness in the epigastrium; frequent vomiting; jaundice; torpidity of the liver.—**KALI BICHROMI-**

CUM. Vomiting of bile, of pinkish, glairy fluid; pressure and heaviness in the stomach after eating; vomiting of white mucus; acidity of the stomach, with pressure and burning.—URANIUM NITRATE. Vomiting of food; agonizing, burning pain in the stomach, with deep ulcerative soreness.

Consult also the therapeutic hints under "Gastralgia."

Hæmatemesis.—ACONITE is indicated by full, bounding, hard pulse, with great bodily heat, thirst, profuse sweat, cold sweat on the forehead and extremities. Sudden, severe pain in the stomach.—ARGENTUM NITRICUM and ARSENICUM are recognized by the pronounced character of their gastric symptoms; the hæmorrhage is dark, and may be from either bowels or stomach, or both.—BELLADONNA. Congestive fulness and throbbing in the stomach; bounding, hard pulse; vomiting of bright-red blood.—CACTUS. Continuous sickness at the stomach; cold sweat; cold face, cold back, cold hands; sense of constriction about the cardiac and epigastric region.—FERRUM. Vomiting of bright-red blood, partly in lumps; pallor of the face; pulse full, excited; throbbing heat and burning in the stomach, with crampy pains.—HAMAMELIS. Vomiting of dark blood; violent throbbing in the stomach, followed by fulness and gurgling in the abdomen and large, tar-like stools.—IPECACUANHA. Incessant and great nausea and vomiting, with faintness and throbbing at the pit of the stomach; vomiting of bright-red blood or of a tar-like substance. *Melæna*.—MILLEFOLIUM. Profuse hæmorrhage of thin, bright-red blood, often with chilliness. Resembles ACONITE, but lacks its anxiety and keen restlessness.—SECALE. Sudden, violent hæmorrhage, accompanied by terrible distress and burning pain in the stomach. Threatening collapse. Restlessness and coldness, but refuses to be covered.—VERATRUM VIRIDE. Great vascular excitement. Dry, red stripe through the center of the tongue. Contractive pains in the stomach.

Consult also: ARNICA, CARBO VEGETABILIS, CHINA, CROTALUS, LACHESES, STANNUM.

It has been affirmed that GERANIUM MACULATUM, given in half-drachm doses, relieves when all other remedies failed.

CANCER OF THE STOMACH.

The essential cause of cancer in any part of the body is not understood. The stomach is especially prone to cancerous disease, statistics showing that next to the uterus it is most frequently the seat of cancer in its primary form. It occurs somewhat oftener in men than in women. It is essentially a disease of advanced years, three-fourths of all the cases occurring between forty and seventy years of age, and more than thirty per cent. between fifty and sixty years of age. It is exceedingly rare in children. Heredity unquestionably constitutes a predisposing cause, although the correctness of this statement is not admitted by all. The appearance of the disease in successive generations is not an assertion, but a fact, and the readiness with which in some persons slight local injuries assume all the features of malignancy can only be explained upon the assumption of a hereditary predisposition. The entire question of the ætiological relation of other diseases of the stomach to cancer hinges upon this proposition.

Morbid Anatomy.—Cancer of the stomach in the great majority of cases is primary; it may be secondary, and then usually follows cancer of the breast.

Its favorite location is near the pylorus. Welch, whose statistics are recent and generally quoted, from an analysis of 1,300 cases gives the following table: in the pyloric region, 791; lesser curvature, 148; cardia, 104; posterior wall, 68; the whole of the greater part of the stomach, 61; multiple tumors, 45; greater curvature, 34; anterior wall, 30; fundus, 19. Waldeyer (1867) showed that cancer is an epithelial growth and that the varieties in density are largely due to the amount of connective tissue which constitutes the stroma of the growth. "The tendency of the present time is to regard cancer as an epithelial cell containing corpuscular elements which are parasites (protozoa) or degenerated protoplasm or granules. These corpuscular elements transmit or disseminate the disease. They take root and grow in the new soil, extending like a living thing by continuity and contiguity of structure."

The affection begins in the gastric mucous membrane, rapidly involving the entire wall, extending in circumference and in depth and height. The cancer assumes various shapes and forms, as the broad, flat or cauliflower-like masses of soft cancer projecting into the stomach, or the rings formed by the cancerous growth especially in the neighborhood of the pylorus. Ulceration is a common feature of all forms, followed by breaking-down of tissue and hæmorrhage, more pronounced in the soft than in the hard varieties. The weight of the growth may result in considerable displacement of the stomach; the changes which are incidental to the development of the cancer necessarily affect its shape. Thus, if the cardiac end of the stomach is the seat of the cancer, constriction at that point naturally leads to wasting of the stomach with diminution in size, with probable dilatation above the lesion, i. e., in the œsophagus. In the same manner involvement of the pylorus, with stenosis at that point, must of necessity give rise to dilatation of the stomach. Adhesions frequently form, and these may be extensive, usually to the colon, liver or abdominal walls. They are an efficient protection against the danger of perforation. Perforation is not uncommon; it usually occurs into the colon; very rarely into the pleura, lung or pericardium. If into the colon, it is usually followed by vomiting of fæcal matter and the passage of undigested food in the stools. Brinton states that in 507 cases of cancer of the stomach collected by him perforation into the peritonæum occurred in seventeen.

Of the varieties of cancer seen in the stomach, the *scirrhous* usually involves the pylorus, causing stenosis and, later, dilatation of the stomach. It is hard, occurs in circumscribed tumors, or is diffuse, involving the entire stomach, causing thickening and hardness of the wall. It ulcerates superficially. *Medullary* cancer is soft, grows rapidly, involves all the coats, projects into the stomach in masses of various shape, is grayish-white in color, abundantly vascular, and ulcerates early. *Cylindrical-celled epithelioma* occurs in large, rather soft, irregular masses, firmer at the edges. Often it contains cysts, filled with mucus. It tends to ulceration and forms metastases. The *colloid* variety is the least common. It involves all the coats of the stomach, giving rise to uniform infiltration and thickening, and often spreads to neighboring parts, as the peritonæum. Its ulceration usually is superficial.

These forms are not always clearly defined, and they may co-exist or one form may assume the characteristics of another; thus the cylindrical-celled epithelioma may undergo a colloid metamorphosis.

While *secondary* cancer of the stomach is not frequent, primary cancer of the stomach is very often followed by secondary cancer in other parts of the body. Welch shows that out of 1574 cases of cancer of the stomach the lymphatics (chiefly those of the abdomen) were involved in 551 cases; the liver in 475; the peritonæum, omentum and intestines in 357; the pancreas in 122; pleura and lung in 98; the spleen in 26; the brain and meninges in 9. Osler mentions the occurrence in two cases under his observation of a metastatic growth at the navel and beneath the skin near the navel.

Symptoms.—The general clinical history of cancer in its early stage is characterized by the absence of peculiar and striking symptoms. It is not exceedingly rare, especially among old people, to have death result from cancer of the stomach when the patient during life not only suffered little, if any, pain, but aside from slight indigestion and failure of strength and health—such as belong to old age—appeared well.

The onset of the disease is almost always masked. There may be slight indigestion, with some gastric uneasiness after eating, eructations, loss of appetite, some nausea and vomiting, and failure of strength. After a time it is noticed that the patient looks thin in flesh, pallid or even anæmic, and that he is rather more feeble, as to strength, than his condition would seem to warrant. These symptoms rapidly increase. The anæmia becomes unmistakable, after a time intense. The symptoms of indigestion, especially the vomiting, with pain in the stomach, have increased very much. The face is haggard, prostration very great, emaciation startling, and there is œdema about the ankles and legs. The bowels are constipated; the vomitus shows the presence of dark, grumous blood; urine is scanty; the pulse feeble and rapid; he has chills, followed by sweating; and with a constantly increasing prostration and ever progressing anæmia death finally comes from asthenia, sometimes preceded by coma.

As stated, in the earlier stage there may be nothing to attract the attention of patient or observer. The symptoms may be

those of dyspepsia or chronic gastric catarrh with rather early loss of flesh and strength. Later, however, special symptoms assume particular importance, and upon their recognition depends the recognition of the disease. *Pain* is usually present, even in the early stage. It may be epigastric, but as often in the shoulders, between the shoulder-blades, or in the hypochondria; it cannot ever be considered indicative of the seat of the disease. It is not, as a rule, acute or sharp, but rather of a heavy, gnawing, cramp-like character. Sometimes it assumes the form of a neuralgia. I have seen two cases in which it appeared early and continued throughout. Aggravation from eating is common, but not so pronounced as in gastric ulcer. Remarkable freedom from pain is occasionally observed, usually in patients of advanced years.

Vomiting, also, is a constant symptom, growing worse as the case progresses. It varies much in different cases. It may be almost incessant or may come on in paroxysms. In advanced cases it usually occurs several times each day. It is more marked when the seat of the cancer is at the orifices. If the cardiac orifice is involved, it takes place soon after eating; if the growth is at the pylorus, it is delayed for two hours, or more. Dysphagia is liable to be present when the cardia is the seat of the cancer. When there is dilatation of the stomach, vomiting may occur at long intervals, of several days, the amount ejected being very large. If the seat of the cancer is at the fundus or at the anterior or posterior wall, there may be no vomiting. The vomitus consists of a dark-grayish, sour-smelling fluid, containing mucus, food and blood, which under the action of the gastric juice has turned dark. Exceptionally the vomitus is very offensive. Should the tumor break down, vomiting ceases in the larger number of cases.

Hæmorrhage is a common symptom. In the majority of cases it consists of oozing of blood from the ulcerating cancerous mass and has the well-known coffee-ground appearance. It is rarely copious save late in the course of the disease, when large amounts of blood are occasionally thrown up; this more frequently occurs when the seat of the cancer is at the pylorus or lesser curvature.

The *absence* of free *hydrochloric acid* in the gastric juice of the cancerous stomach is of sufficient practical importance to

merit careful attention. It is a condition not peculiar to cancer alone, for it also occurs in atrophy of the gastric mucous membrane and in chronic gastric catarrh, but it is none the less important and valuable in doubtful cases. Lactic acid in the gastric juice is said to be strongly indicative of cancer. (Boas.) The presence of a firm, hard, nodular *tumor* can often be made out by palpation, and is a sign of very great value. It may be located in the epigastric region, or from the weight of the tumor or stomach may have been displaced downward or toward either side. Struempell cites a case in which the stomach, in a case of cancer at the pylorus, was found a hand's breath above the symphysis pubis. In many cases the character of the tumor prevents detection by palpation (as in the case of a diffuse infiltration of the walls of the stomach or when the cancerous mass protrudes inward); in others the enlargement is concealed by the liver or ribs. Thus, a tumor situated at the cardia, posterior wall or lesser curvature is practically beyond the reach of physical examination; a tumor located at the pylorus or anterior wall or on a considerable portion of the greater curvature can usually be detected. In conducting the examination the patient must be placed on the back, with the legs well drawn up, so as to relax the abdominal walls. It is advisable also to force the tumor down by directing the patient to make deep inspirations and by placing him for a time in the knee-elbow position. Dilatation of the stomach being present in many cases of pyloric involvement, the examination would be incomplete if made without reference to its signs. Secondary growths in the liver, lymphatics in groin and supraclavicular spaces must be made the objects of careful search. Percussion yields a muffled tympanitic sound.

Anæmia appears early in the history of the case and prevails throughout. It is pronounced and progressive, with a lessening of the number of the red blood-cells, quite frequently reaching fifty per cent., and usually leucocytosis, the ratio of white to red blood corpuscles, according to Welch, having in one case reached one to twenty. The anæmia is accompanied with progressive wasting of flesh; it eventually terminates in a profound cachexia, more marked in cancer of the stomach than in almost any other condition known. Œdema of the ankles and legs, sometimes general anasarca, prevails, with rapid and fee-

ble pulse and constantly increasing weakness. Occasionally there is palpitation of the heart and dyspnoea, resembling cardiac disease.

While the temperature usually is normal, there are exceptions in which, when the disease has advanced, there is a rise reaching 102°, and more, maintained for a considerable period of time; eventually the temperature drops again to normal and even subnormal. Chills, followed by sweating, are occasional features. The intellect generally is clear, but toward the close a low delirium, preceded by a state of irritability and restlessness, is not infrequent, succeeded by coma (coma diaceticum), with or without dyspnoea, terminating in death.

The *complications* liable to arise are either incidental to the progress of the disease—as chronic gastritis or dilatation of the stomach—or depend upon the appearance of secondary growths in other parts of the body. The liver very often suffers extensively, and jaundice is frequently seen. Peritonitis also is common, at times with ascites. Pleuritis, pyopneumothorax, pulmonary abscess, gangrene or œdema, thrombi, especially in the femoral or saphenous vein, and chronic nephritis are occasional complications.

The duration of the disease is from eighteen months to two years. In the greater number of cases it is impossible to fix the time of its beginning.

The prognosis is hopeless.

Diagnosis.—The most reliable diagnostic signs are: the presence of a tumor; progressive anæmia; rapid loss of flesh and strength even in the early stage; the character of the vomitus; the absence of free hydrochloric acid in the gastric juice. The following table, by Welch, is generally reproduced in recent works:

| GASTRIC CANCER. | GASTRIC ULCER. | CHRONIC CATARRHAL GASTRITIS. |
|--|---|---------------------------------|
| 1. Tumor is present in three-fourths of the cases. | 1. Tumor rare. | 1. No tumor. |
| 2. Rare under forty years of age. | 2. May occur at any age after childhood. Over one-half of the cases under forty years of age. | 2. May occur at any age. |
| 3. Average duration about one year, rarely over two years. | 3. Duration indefinite; may be for several years. | 3. Duration indefinite. |

- | | | |
|--|---|---|
| 4. Gastric hæmorrhage frequent, but rarely profuse; most common in the cachectic stage. | 4. Gastric hæmorrhage less frequent than in cancer, but oftener profuse; not uncommon when the general health is but little impaired. | 4. Gastric hæmorrhage rare. |
| 5. Vomiting often has the peculiarities of that of dilatation of the stomach. | 5. Vomiting rarely referable to dilatation of the stomach, and then only in a late stage of the disease. | 5. Vomiting may or may not be present. |
| 6. Free hydrochloric acid usually absent from the gastric contents in cancerous dilatation of the stomach. | 6. Free hydrochloric acid usually present in the gastric contents. | 6. Free hydrochloric acid may be present or absent. |
| 7. Cancerous fragments may be found in the washings from the stomach or in the vomit (rare). | 7. Absent. | 7. Absent. |
| 8. Secondary cancers may be recognized in the liver, the peritonæum, the lymphatic glands, and rarely in other parts of the body. | 8. Absent. | 8. Absent. |
| 9. Loss of flesh and strength and development of cachexia usually more marked and more rapid than in ulcer or in gastritis, and less explicable by the gastric symptoms. | 9. Cachectic appearance usually less marked and of later occurrence than in cancer, and more manifestly dependent upon the gastric disorders. | 9. When uncomplicated, usually no appearance of cachexia. |
| 10. Epigastric pain is often more continuous, less dependent upon taking food, less relieved by vomiting, and less localized than in ulcer. | 10. Pain is often more paroxysmal, more influenced by taking food, oftener relieved by vomiting, and more sharply localized than in cancer. | 10. The pain or distress induced by taking food is usually less severe than in cancer or ulcer. Fixed point of tenderness usually absent. |
| 11. Causation not known. | 11. Causation not known. | 11. Often referable to some known cause, such as abuse of alcohol, gormandizing and certain diseases, as phthisis, Bright's disease, cirrhosis of the liver, etc. |

12. No improvement, or only temporary improvement, in the course of the disease.

12. Sometimes a history of one or more previous similar attacks. The course may be irregular and intermittent. Usually marked improvement by regulation of diet.

12. May be a history of previous similar attacks. More amenable to regulation of diet than is cancer.

Treatment.—Treatment is limited to efforts to render the patient as comfortable as possible and to sustain his strength; thus life may be prolonged and rendered more endurable. The *diet* must be regulated as circumstances demand; fresh milk and koumyss, especially the latter, are usually acceptable. Hydrochloric acid, exhibited in minute doses, is for physiological reasons presumed a great help to digestion. *Erucltations* of an acrid, irritating character require magnesia or bicarbonate of soda. *Vomiting* is usually controlled by opiates, ice, iced champagne, kreosote, iodine, lavage. *Pain*, especially when it prevents sleep, may imperatively demand the use of opiates. Osler recommends of morphia one-eighth of a grain, combined with carbonate of soda (grs. 5) and bismuth (grs. 5 to 10). *Hæmorrhage* rarely demands treatment. Bits of ice may be swallowed and cold applications made to the epigastrium; ergot or ergotine in physiological doses may be needed in exceptionally severe cases. Constipation is at times troublesome; laxatives must be avoided, but enemata or glycerine suppositories may be prescribed. Lavage is not only useful to control vomiting, but is called for when there is dilatation, as in pyloric stenosis.

Since Billroth first advised and practiced removal of the stomach for cancer, the operation has been performed several times, so far with satisfactory success in a very few cases only.

Therapeutics.—The utmost that can be expected is a measure of relief from pain which at least lessens the necessity of constantly using opiates and a sustaining effect which prolongs life beyond the period usual in cancer. To obtain even these results the totality of symptoms must be carefully noted and the remedy selected with painstaking observance of passing changes in the symptoms. Undoubtedly ARSENICUM is of value here oftener than any other remedy. I have in a number of cases found the IODIDE OF ARSENIC, in the third decimal trituration, capable of doing much good. It controls the gastric pain,

aids digestion, exerts a favorable effect upon the anæmic condition, lessens the utter prostration of the vital forces, and appears to make its kindly influence felt in every direction.—PHOSPHORUS is another remedy worthy of patient use. Its close relation to the stomach and liver, and its action upon the nervous system and blood, warrant the presumption that the claims made for it are not without foundation in fact.

HYDRASTIS is credited with having cured scirrhus cancer of the stomach in which there was involvement of the subclavicular lymphatic glands. A tablespoonful twice a day was given of an infusion of four drachms of the bark in half-a-pint of water.—CONIUM is worthy of study on account of its gastric symptoms and its relation to scirrhus indurations and hardness of glandular enlargements.—LACHESIS is considered of value by J. S. Mitchell when there is severe pain and hæmorrhage. William Owens urges the use of ACETIC ACID in the first dilution, given at brief intervals, and cites at least one case successfully treated in which, from the symptoms related, a diagnosis of cancer appears to have been justified.

HÆMORRHAGE FROM THE STOMACH.

Hæmorrhage from the stomach (hæmatemesis, gastrorrhægia) may result from any of the following: *Local diseases of the stomach* as a) cancer or ulcer; b) diseases of the walls of the blood-vessels of the stomach (changes in the coats of the vessels; varicosis; miliary aneurism); c) active congestion, as in acute gastric catarrh. *Passive congestion*, the result of obstruction in the portal system. This may be a) hepatic (cirrhosis of the liver, thrombosis of the portal vein; pressure anywhere upon the portal vein or any of its branches, as from a tumor; in chronic disease of the heart or lungs); or b) splenic. The latter is infrequent. *Traumatism*, mechanical (blows, injuries to the stomach from the presence in it of sharp, pointed foreign substances), chemical (corrosive substances, phosphorus) or thermal (very hot liquids). *Acute infectious diseases*, characterized by toxic action of the specific ptomaines upon the blood. Here belong typhus, typhoid fever, yellow fever, relapsing fever, malaria, erysipelas, diphtheria, cholera,

small-pox, scarlet fever, measles. *Other constitutional diseases* and states in which the integrity of the blood is affected, as hæmophilia, purpura, scurvy, chlorosis, anæmia, cholæmia. *Certain diseases of the nervous system*, especially hysteria; also epilepsy and progressive paralysis of the insane. *Hæmorrhage without the stomach*, emptying into the stomach and then ejected by vomiting. Here belong the swallowing of blood in post-nasal bleeding and in hæmoptysis; hæmorrhage from the rupture of an abscess or blood-vessel in the œsophagus or duodenum; the swallowing of blood by an infant when nursing from a bleeding breast. Also causes not enumerated above, such as *melæna neonatorum*, rupture of an *aneurism* of the aorta or any of its branches into the stomach.

In general practice, hæmorrhage from gastric ulceration and from cirrhosis of the liver is of especial interest because of the relative frequency with which they occur.

The symptoms which precede the vomiting are faintness, qualmishness, sickness at the stomach, perhaps with some headache and dizziness. Quite often the onset of the hæmorrhage is sudden and unexpected. Anæmia is always present, according to the extent of the bleeding. Syncope is frequent, and fatal cases of it are on record in which there was no outward manifestation of the copious hæmorrhage taking place within the stomach.

If the hæmorrhage is passive and insignificant, the blood appears dark, is fully digested, sometimes clotted and even fetid; it may be more or less mixed with substances which throw light upon the cause of the bleeding. The most dangerous forms of gastrorrhagia are those arising from ulcer, cirrhosis, or the bursting of an aneurism.

The diagnosis is rarely difficult. For differentiation of hæmatemesis from hæmoptysis see the chapter on Simple Ulcer of the Stomach.

If there is reason to presume that deception has been practiced, as is often done by hysterics or malingerers, all the circumstances surrounding the case must be considered; it may even be wise to make chemical and microscopic tests to determine the actual presence of blood corpuscles in the vomitus. The first and specific cause of a hæmorrhage and, if in the stomach, its exact seat are not always easily determined. Fatal bleeding

may occur from a local lesion so minute as to escape detection, while in other instances very serious hæmorrhage may be due to diapedesis.

Treatment.—Absolute rest is of the utmost importance. The patient's alarm must be quieted by perfect self-possession on part of the attendants and frequent words of encouragement by the physician. The salutary, reassuring effect of these cannot be overestimated. Bits of ice not only relieve the nausea and faintness, but are the best thing to be used for the bleeding; ice may be given *ad libitum* and a light ice-bag be applied to the stomach. If the bleeding is severe, the head of the patient may be lowered and a ligature applied to the leg or arm, or both. The use of styptics is not advisable; they irritate the stomach and do little, if anything, towards arresting the bleeding. If the physician feels bound to exhibit a hæmostatic, gallic acid (grs. x) or alum are least objectionable. Ergot, in physiological doses, may be used when the bleeding occurs from quite small vessels; it is of no service whatever when hæmorrhage takes place from large blood-vessels. Syncope, if passing, requires no attention, and may even aid in stopping the bleeding by lessening the force of the heart's action, thus increasing the possibility of a clot forming. Temporary elevation of the head is usually sufficient to bring the patient back to consciousness.

Transfusion of blood has been largely displaced by the infusion of a saline solution (a drachm of sodium chloride to the pint of warm water). "Not over a half or three-quarters of a pint should be introduced at first. When a recurrence of the hæmorrhage is feared, more can be used later, should the urgency of the symptoms again demand it. The solution should be made with boiled, preferably distilled, water. It must be of the body temperature and is readily introduced, all that is required being a small glass canula, a piece of rubber tubing, and a funnel. The fluid might be injected into the cellular tissue, preferably between the scapulæ, in place of a vein. The resulting benefit would be as great, though not so promptly produced, and the danger, that of sudden raising of vascular tension, would be largely obviated." (D. D. Stewart in Hare's System of Therapeutics.) The injected solution may be diffused by massage. After the cessation of the hæmorrhage the

patient must be kept in bed and absolute rest of the stomach be maintained for a considerable time by rectal feeding. When again allowed to eat, the patient must be closely watched, and food, carefully selected, must be given in small amounts only, cold, and in liquid form.

Therapeutics.—**ACONITE.** Acute congestion or inflammation of the gastric mucous membrane. Full, bounding, hard pulse. Great bodily heat, thirst, profuse sweat; cold sweat on the forehead and extremities. Præcordial anxiety, with coldness of the extremities. Excruciating pain in the stomach, with gagging and retching; fear of death. Hæmorrhage preceded by sensation of a cold stone lying in the stomach, notwithstanding repeated stools and vomiting.—**ARSENICUM.** Periodic hæmorrhage in cancer or ulcer of the stomach. Constant retching and nausea; faintness; burning pain at the stomach, with intense thirst, with a feeling that cold water would relieve this burning; quick, thread-like pulse; characteristic anxiety and restlessness; blood dark and offensive.—**BELLADONNA.** Congestion; sense of fulness and warmth in the stomach. The blood feels hot; usually bright-red.—**CARBO VEGETABILIS.** Collapse. Frequent fainting. Icy coldness of the surface and of extremities. Hippocratic face. Cold breath. Small, almost imperceptible, pulse. Wants to be fanned constantly and hard. Blood bright-red.—**CACTUS.** Continuous sickness at the stomach. Coldness of face, back, hands. Cold sweating; sense of constriction about cardiac and epigastric region.—**FERRUM.** Vomiting of bright-red blood; pallor of the face; pulse full and excited; throbbing, heat and burning in the stomach; crampy pain.—**HAMAMELIS.** Fulness and pain precede the hæmorrhage; violent throbbing in the stomach; vomiting of dark blood; fulness and gurgling in the abdomen, followed by black, tar-like stools. Weak, quick pulse, with restlessness; cold, profuse sweat.—**IPECACUANHA.** Hæmorrhage sudden, accompanied with incessant nausea and much vomiting; faintness and anxiety; blood bright-red; sour; dark, like tar. Coldness and pallor of the face and body. Pulse scarcely perceptible; oppressed breathing; great thirst.—**MILLEFOLIUM.** Hæmorrhage profuse, thin, bright-red, often with chilliness.—**NUX VOMICA.** Throbbing pain in the head; pale, distressed face; belching; constant nausea; stomach full and distended, sore to

the touch; burning anxiety and pressure in the præcordial region; pain in the region of the spleen; constipation, with black stools; urine turbid, dark; fainting; weakness; temperature of the skin *increased*; pulse full, hard, quick.—PHOSPHORUS. Bright blood; drowsiness; sleepy; face, lips, gums and tongue are pale; thirsty, better from drinking cold water; loathing of food; heaviness and heat at the pit of the stomach, which is distended; abdomen soft; urine dark; skin warm, with partial perspiration; pulse quick, energetic.—SECALE. Passive bleeding; blood fluid, does not coagulate easily and is of offensive odor; great weakness, but no pain. Face, lips, tongue and hands deathly pale. Abdomen soft and cold; cold sweat; quick, thread-like pulse; oppressed breathing. Or sudden hæmorrhage, violent and accompanied with great distress and burning pain in the stomach. Threatened collapse, restlessness, coldness, but cannot bear to be covered.—VERATRUM ALBUM. Slow pulse; ashen color of the face; coldness of the skin; chilliness; fainting; thirst for cold drinks; any motion at once brings on nausea and fainting. Cold sweat.—VERATRUM VIRIDE. Great vascular excitement. Dry, red stripe through the middle of the tongue. Contractive pain in the stomach.

MISCELLANEOUS AFFECTIONS OF THE STOMACH.

Stenosis of the cardiac orifice is a rare affection, exceptionally spasmodic, but oftener due to the presence of cicatricial contractions, ulceration, or scirrhus involvement of the œsophagus or of that portion of the stomach in the immediate vicinity of the cardiac orifice. Aneurism or tumor in closely related parts, or the presence of some foreign body in the œsophagus, or the local action of a violent corrosive poison, may produce stricture.

The symptoms are fairly characteristic. There is difficulty or impossibility of swallowing food or drink. If there is not complete stenosis, liquids may be swallowed, though often only with considerable effort and choking; if complete, nothing can pass the orifice. There is dilatation of the œsophagus above the stricture, forming a pouch in which food is indefinitely retained. It is regurgitated at frequent intervals if the œsopha-

geal dilatation is not great, and then returns practically unchanged. If the dilatation is great, food may be retained for a long time, and when returned is fermented, covered with mucus, and highly offensive. Ulceration may exist, in which case the act of swallowing is very painful. Considerable discomfort and uneasiness is felt at all times.

The appetite of the patient for a long time is unimpaired, and the difficulty of appeasing hunger gives rise to much and intense suffering. Emaciation and loss of strength naturally result; the general health breaks down; the vital forces become exhausted; a low fever sets in, dropsical effusion takes place in the lower extremities, and death finally occurs from starvation.

The diagnosis is not difficult. The prognosis is unfavorable, save in the spasmodic form. Treatment is palliative and supporting. If the stricture is spasmodic, as is shown by the passing of the bougie, feeding with the tube is indicated. If the bougie cannot be passed, nutritive enemata must be employed. Baths are useful in relieving the thirst from which the patient usually suffers; bits of ice in the mouth may be allowed for the same purpose. Dilatation of the stricture and other, more radical, operative measures are indicated.

Stenosis of the pyloric orifice is the result of ulcerative processes at or near the pylorus; or of cancerous disease; or of fibroid thickening of the submucous tissues; or of the pressure of a tumor (as of the gall-bladder); or of adhesions, such as may result from inflammation set up by some injury received or in the course of inflammatory processes involving the pylorus or the adjacent structures. The symptoms are those of dilatation of the stomach, which is produced by retention of the gastric contents that cannot pass through the pylorus into the duodenum.

Lebert and others have described a hypertrophic stenosis of the pylorus which not only occurs in cancer, but has been noticed as an independent affection. It is practically a circumscribed cirrhosis.

Cirrhosis (sclerosis, fibroid induration) of the stomach is a rare disease, more frequent among women than among men, and largely confined to the middle-aged. In the early stage it consists of a cellular infiltration of the connective tissue, and is

generally understood to be a non-suppurative inflammation of the interstitial, connective and supporting tissues of the organ, not affecting those by which its proper physiological functions are performed. The microscope yields largely negative results, among them an absence of cancer cells. The structures are tough and cartilaginous; the stomach appears like a firm, smooth, round or oval tumor, with coats of dirty-grayish color and a cavity much smaller than normal. If divided with the knife, the walls do not collapse.

The causes of cirrhosis of the stomach are not known. It may occur as a feature of the late stage of chronic gastric catarrh, and has also been associated, without good cause, with alcoholism and traumatism. The symptoms are not characteristic. There is indigestion, with its attendant results, and in some cases gastralgia. Again the symptoms resemble pernicious anæmia and even cancer. As the tumor increases, the gastric symptoms assume a more pronounced character, and there may be complete anorexia, with subsequent emaciation and progressive general physical weakness. Peritonitis not infrequently occurs. Death usually takes place from peritonitis or dropsy.

The diagnosis is difficult and rests largely upon the exclusion of other and similar diseases. From cancer it can hardly be distinguished during life, save as the cachexia is less pronounced and hæmorrhage of the stomach is wanting. Fenwick recommends distending the stomach in all doubtful cases by making the patient drink freely of soda-water, by which means a strongly tympanitic sound, in case of hypertrophy, is obtained on percussion. The prognosis is bad; the duration indefinite, the case usually continuing for several years. Treatment is unsatisfactory. The lessened capacity of the stomach demands the use of very nourishing, concentrated foods. In many cases severe pain is felt during the latter part of the illness, and copious draughts of hot water, as hot as the patient can bear, have proved grateful.

Gastromalacia (self-digestion of the stomach, post-mortem softening) is now held to be simply a post-mortem self-digestion of the coats of the stomach, prevented during life by the influence of the vital principle. The process is the same, on a larger scale, which during life and under appropriate circumstances gives rise to the simple, peptic ulcer.

Atrophy of the stomach occurs rarely as an independent affection; it may be a feature of chronic gastric catarrh in its later stages; it is also secondary to cancer and cirrhosis of the stomach. Fenwick asserts that it is seen in cancer of the breast, and that this fact accounts for many otherwise inexplicable cases of death after successful operation for cancer. The same authority states that the atrophy of the gastric mucous membrane may be combined with inflammatory conditions of some of the other coats of the stomach, and then proves fatal by exhaustion of the patient; or it occurs in cases which are usually classed as idiopathic anæmia, and is the result of degeneration, as shown after death. There exists a close relation between atrophy of the gastric mucous membrane and pernicious anæmia, and, as stated by Pepper, upon this combination of profound anæmia and digestive disturbance the diagnosis of such cases may be made. This applies, however, to those cases only in which the disturbance of digestion is well pronounced.

The treatment is that of the late stage of chronic gastric catarrh.

Abscess in the wall of the stomach is a rare disease, with symptoms closely resembling a violent acute gastritis, rapidly progressing to great prostration, delirium, and a fatal termination within a few days. It occurs in connection with cancer, pus finding its way into the walls of the stomach through the mucous membrane; it is said that cases are occasionally seen in fibroid thickening of the wall. A form has been described in which the submucous tissue becomes the seat of general suppuration, as mentioned in the article on Acute Gastric Catarrh.

Albuminoid (waxy, lardaceous) disease of the stomach sometimes appears in the course of chronic gastric catarrh, and is usually connected with similar changes in the liver, spleen and kidneys. It cannot be recognized during life. Examination after death shows a pale and bloodless condition of the mucous membrane, which gives a brownish-red reaction when treated with iodine. There is destruction of the epithelial cells, which are found to have been converted into an irregular, homogeneous mass.

Tubercle of the stomach is very rare. When found, it is oftenest seen in the greater curvature and is associated with exten-

sive ulceration. Wilson Fox never saw it commence in the mucous membrane, but found perforation of the stomach from tubercles which commenced in the peritonæum, passing from without inward.

Perforation of the stomach is seen in connection with gastric ulcer and cancer, and has been discussed in the chapters devoted to them. It may also result from injury from without (a stab or thrust) or from within (some sharp, pointed foreign body in the stomach); but such cases are exceptional. If the perforation is small, a circumscribed peritonitis, possibly with the formation of an abscess, results; if large, it is followed by a violent general peritonitis, with tendency to a fatal termination. The office of inflammatory adhesions in the prevention of perforation has been pointed out.

Rupture of the stomach in health is almost always due to external violence received when the organ is distended with food. If the gastric walls are diseased, a slight force may suffice to bring about rupture. It has been asserted that the accident has resulted from overdistension with food or gas, but it probably was due to other causes. Ziemssen states that he saw it occur from distension depending upon fermentation in a stomach which was the seat of stricture resulting from the healing of a chronic ulcer; the symptoms were those of collapse, followed by peritonitis.

DISEASES OF THE INTESTINES.

CATARRHAL ENTERITIS-DIARRHŒA.

The term "diarrhœa" as synonymous with catarrhal enteritis is incorrect in so far as diarrhœa is only a symptom which may be found when there is absolutely no catarrh of the intestinal mucous membrane (as in cases due to nervous or emotional influences) and which, on the other hand, may be lacking when catarrh is clearly pronounced.

The disease is found in all climates and occurs at any age, with a preference for children. A predisposition to it is quite pronounced in some persons. One attack leaves a tendency to recurrences.

Ætiology.—Among the immediate causes of acute catarrhal enteritis the following may be enumerated: *Errors of diet*, over-eating or partaking of some indigestible article of food; children readily fall into such errors unless carefully guarded, especially during the fruit season. Idiosyncrasy is an active factor, many persons being unable to take certain articles of food—as ice-cream or strawberries—without bringing on a diarrhœa.

Poisoning, due to the formation in the body of organic poisons which are the product of fermentation or decomposition of food (as milk), or from eating spoiled or poisoned canned food, or from the administration of irritating drugs, as mercury, arsenic, antimony, powerful drastics, etc. Sudden *changes in weather*, as a decided fall in temperature, particularly when the body is insufficiently protected, or a sudden chilling of the body when perspiring. Equally effective is *great heat*; children frequently suffer from it during the hot months of the year (summer diarrhœa). Changes in *drinking water*, even though the water may seem wholly free from injurious contents and proves entirely wholesome to persons accustomed to it. *Changes in the constitution of the intestinal secretions*. The bilious diarrhœa, so called, is an illustration in hand, the sudden influx into the intestine of a large amount of bile being responsible for the intestinal disturbance set up. *Trauma*, as a blow upon the abdomen, the presence of hard lumps of fæcal matter in obstinate constipation, or even irritation from the presence of intestinal worms. *Nervous influences*, depending upon a sudden excitement, from fright or other powerful emotions, often cause a diarrhœa which, though lacking the true catarrhal element, yet symptomatically belong under this head. Hysterical people are prone to suffer thus, the symptoms not only yielding reluctantly, but cases not rarely assuming the chronic form.

Among the *secondary* causes are classed: *Extension* of inflammatory processes from adjacent parts (peritonitis, hernia, ulcerations, tubercular or cancerous; some writers mention here an extension of gonorrhœal vaginitis to the intestine). *Circulatory* disturbances, due to the engorgement of the portal vessels, as found in cirrhosis of the liver, chronic diseases of lungs and heart. Certain *infectious diseases* (cholera, dysentery, typhoid fever, pneumonia, pyæmia, septicæmia, tuberculosis).

Extensive burns of the skin. Affections associated with a *profound cachexia* (anæmia, cancer, Bright's disease, Addison's disease).

Morbid Anatomy.—The pathological changes are those found elsewhere in catarrh of the mucous membrane, save that the intestinal mucous membrane not only is but slightly hyperæmic, but in the majority of cases appears pale and covered with mucus; intense hyperæmia is exceptional. Cellular infiltration is common. Purulent products on the surface of the mucosa are seen in severe cases, with superficial erosions. The solitary and agminated follicles are greatly swollen, with erosions in the center (follicular ulceration). In cases of long standing, hyperplasia of the connective tissue often exists, giving rise to thickening of the mucous membrane, which then presents a puffy, uneven appearance on the inner surface of the intestine. "Circumscribed hyperplasia of the connective tissue may actually lead to the formation of polypi. If the orifices of Lieberkuehn's follicles are stopped, we have a cystic degeneration of the follicles from the retention of the intestinal juices." On the other hand, and especially in the chronic diarrhœa of children, there may be atrophy of the mucous membrane, chiefly affecting the glandular structure, connective tissue gradually displacing the glands. This is most pronounced in the ileum and colon, and may involve the muscular coat.

Acute Catarrhal Enteritis.—Symptoms: Diarrhœa, i. e. increased frequency of the stools, which are of an abnormally loose consistency, is the chief symptom. It is the result of increased peristalsis and of the presence of a large amount of fluid in the intestinal tract. The number of stools varies greatly, from three or four to twenty, or more, per day. In consistency they are watery or pappy, like thin gruel. The color ranges from a dirty grayish-white to yellow, yellowish-brown, green, sometimes blackish-brown, depending largely upon the amount of bile present. Occasionally there is slight admixture of blood and of flakes of yellow-brown mucus. Bits of undigested food may be carried along under the impulse of greatly excited peristaltic action (lienteric diarrhœa). The stools usually are alkaline in reaction and in amount out of all proportion to the food eaten. The microscope shows the presence of a perfect host of bacteria, cylindrical epithelium, triple

phosphates, cholesterine, fatty acids, occasionally pus-cells, muscular fibres, remnants of food, etc.

Pain is almost always present, especially in cases due to errors of diet. It frequently is worse before the stool, and is usually relieved by pressure upon the abdomen. It is paroxysmal, but sometimes almost continuous, and of a "colicky" character. If there is involvement of the colon, tenesmus is present. Tympanitis of moderate degree is common, but the abdomen may be flat. Gurgling and rumbling noises in the abdomen (borborygmi) are due to the rapidity with which increased peristaltic effort carries liquids and gas along the intestinal canal; this abnormal peristalsis can be easily felt by placing the hand upon the abdomen.

Loss of appetite and thirst are nearly always experienced. The tongue usually is dry and coated, there is little, if any, fever, the urine is scanty, high-colored, and rich in urates. In severe cases there is much vomiting, intense thirst, and considerable fever, with a temperature of 102° , or more. There is reason to suspect a complication of some sort if there is a continuously high fever or a sudden and marked elevation of temperature. In very bad cases all the symptoms are intensified, especially the pain; the excessive loss of the fluids of the body becomes a threatening feature, and collapse may occur.

The duration is from two or three days to a week or ten days.

Cholera morbus (cholera nostras, sporadic cholera) may be described as an intensely acute catarrh involving both the gastric and intestinal mucous membrane; in all probability it is due to the absorption of some toxin from the intestinal canal. It occurs chiefly during the season of the year when the days are very hot and the nights cold. Its readiest victims are young persons and those suffering from nervous exhaustion. Errors in diet, drinking ice-water and taking cold are the principal direct causes.

Symptoms.—Although sometimes preceded, for a short time, by general indisposition, with a sense of gastric discomfort and heaviness, the onset is more often sudden, usually awaking the patient from a sound sleep by nausea, vomiting and sense of distressing fulness throughout the abdomen. Vomiting is violent from the start, consisting at first of the contents of the stomach, which are quickly ejected, then bilious, then watery

substance. Paroxysms of vomiting follow each other rapidly; often vomiting is incessant. Purging occurs simultaneously or very soon after vomiting has begun. This also is violent, first fæcal and offensive, then watery, whitish, odorless, or of faint mouse-like odor. The evacuations come with a gush, are copious, choleraic and rapidly exhausting. Pain is severe, often constant, with aggravations before purging and momentary relief after stool. There is twitching and cramping of the muscles, especially of the calves of the leg, sometimes exceedingly painful. The patient complains of great thirst, and is anxious and restless to the last degree. Urine is scanty, high-colored, contains albumin, casts, much indican; occasionally it is suppressed. Pulse is weak and thread-like; the abdomen contracted; exhaustion rapid and profound. The voice is weak, husky and of high pitch; the tongue and breath are cold, and the body bathed in a cold, clammy sweat; the countenance is hippocratic; surface temperature low, though the internal temperature may be elevated; respiration becomes sighing, and collapse seems imminent.

All these symptoms may develop rapidly, and in persons of feeble powers of resistance, or in the very young or quite old, death from collapse may take place within a few hours. In such cases vomiting and purging may suddenly cease and incessant hiccoughing take its place. Usually, however, the danger passes off in a few hours, and convalescence is fully established within twenty-four or forty-eight hours. The patient rallies slowly from the extreme prostration, and may not recover his usual health for a week or two. In exceptional cases subacute intestinal catarrh remains for some time; the development of a remittent fever of the typhoid type or of dysentery is among the possibilities.

The diagnosis is not difficult, except as the affection closely resembles Asiatic cholera. The non-existence of cases of Asiatic cholera and bacteriological tests will determine the question. Poisoning with antimony, arsenic and certain fungi closely resembles cholera morbus.

Chronic catarrhal enteritis may result from repeated attacks of acute intestinal catarrh, brought on, in the majority of cases, by the continued operation of causes which are primarily responsible; hence the frequency of the disease in camp and

prisons. It also occurs in connection with any chronic lesion in the intestinal tract, as tubercular ulceration or cancer, and with chronic engorgement of the portal circulation, as in cirrhosis of the liver, chronic disease of the heart or lungs; it is often observed in diseases characterized by cachexia, as phthisis or chronic malarial poisoning.

The pathological changes at first are those of an acute catarrh; later the walls of the affected portion of the intestines become thickened by hypertrophy, with narrowing of the lumen of the gut, which rarely may amount to stenosis. Dilatation occasionally occurs. Mucous, serous and purulent secretions abound upon the diseased structure, depending upon the catarrhal irritation of the mucous membrane and the frequency of existing ulcerative processes. There is thickening of the mucosa and the formation of polypi and of cysts from the blocking up of intestinal glands and the subsequent retention of intestinal juices; also occasional and marked thinning of the intestinal wall and atrophy of the mucous membrane and glands. Ulceration of the lymphatic follicles, especially in the descending colon, results from necrosis; the ulcers are conical and sharply defined, and spread in both diameter and depth until they approximate each other and give to the mucous membrane a honey-combed appearance. The primary ulcer has a diameter of one-tenth to one-fourth of an inch. By coalescing, large spots of ulceration are formed which may penetrate deep enough to cause perforation, which here, as in ulceration of the stomach, is often prevented by fixed inflammatory adhesion. Incidental cicatrization gives rise to contraction of tissue and may seriously lessen the lumen of the intestine. When the duodenum is the seat of the chronic catarrh, this thickening of the coats may obstruct the entrance of bile and pancreatic juice into the intestine. The ileum and colon, less often the rectum, may be the seat of the disease.

Symptoms.—The symptoms are: diarrhœa, with gastric and intestinal indigestion, accompanied with more or less uneasiness in the bowels, sometimes severe pain and constitutional effects of more or less severity, not infrequently sufficient to cause death; these constitutional effects are chiefly due to innutrition, weakness and general exhaustion.

The diarrhœa is not as pronounced as in the acute form of ca-

tarrh, and in the majority of cases consists of from one to eight stools each day, of watery or pappy, semi-solid consistency, varying in color from a dirty-whitish gray to a dark brown, containing mucus, particles of fat, undigested food, sometimes streaks of blood, and in some cases dark blood which originated in the upper intestine. These stools may occur regularly in the morning, or just after eating, or at irregular hours. Often diarrhœa alternates with constipation. There is considerable intestinal flatulency and borborygmi, with much pain in the bowels, usually worse after eating and just before a stool; this is due to the accumulation of gases and to the local irritation, intensified during peristalsis and when the discharges pass over the sore surface. The presence of gastric catarrh in the majority of cases is indicated by loss of appetite, bad taste in the mouth, weight in the stomach, eructations, heart-burn, etc. There is general indisposition and lack of energy, and an almost characteristic tendency to despondency and hypochondriasis. Impairment of nutrition is plainly shown in the appearance of the patient; he moves slowly and without energy; is pallid; thin in flesh; complains of palpitation of the heart and dyspnœa from slight exertion; has occasional spells of feverishness, without a perceptible rise of temperature save as in some instances the diurnal variations are very pronounced. The case thus progresses tediously, with periods of improvement followed by relapse. With continuance of the affection emaciation eventually becomes very great; the fever is unmistakable; there is local or general œdema, and death results from exhaustion, usually hastened by some intercurrent affection, as peritonitis, bronchitis or pneumonia.

In mild cases the diarrhœa may be very moderate or wholly wanting, or there may even be constipation; the latter is largely due to the muscular atony of the intestinal wall at a time when increased peristalsis is in reality rendered necessary by the presence of large amounts of sticky, tenacious, intestinal mucus which not only interferes with the processes of digestion and absorption, but also with the propulsion of the stool. Intestinal flatulency and pain are almost always present. Traces of pus in the stool are an indication of intestinal ulceration, and must not be allowed to escape attention.

The special or exclusive involvement of any one portion of

the intestine cannot always be determined from the symptoms, and usually is a matter of slight practical importance. However, when the seat of the catarrh is in the duodenum, there is jaundice, fatty stools and gastric catarrh. If in the colon, the stools are very large and the abdominal pain just before the stool very severe. If the rectum is involved, there is tenesmus and the stools contain mucus and muco-purulent matter.

The *course* of the disease is tedious; the prognosis must be guarded in case of children, aged people or persons debilitated from any cause. If recovery takes place, recurrences of diarrhœa from slight indiscretions in diet are the rule. Complications are manifold, as peritonitis, proctitis, bronchitis, pleuritis, pneumonia. Statistics show that corneal ulceration occurs in connection with camp-diarrhœa. When the rectum is involved, hæmorrhoids, prolapse of the rectum and rectal eczema are frequent. Persistent constipation, derangements of digestion and nutrition, and material lessening of the lumen of the intestine are liable to follow persistent chronic diarrhœa.

Diagnosis of Catarrhal Enteritis.—From the standpoint of a precise diagnostician it is desirable to determine just what portion of the intestinal tract is affected, even though such knowledge may be of no great value in the management of the case. If the *small* intestine is the seat of the catarrh, the diarrhœa is less active, flatulency not quite so pronounced, pain is of a more intense colicky character, and the stools contain a less copious admixture of mucus, with a larger amount of undigested food. In duodenitis we find jaundice, fat in the stools, and symptoms of gastric catarrh. Jejunitis and ileitis cannot be positively distinguished by the symptoms. Involvement of the *large* intestines has less colicky pain, sometimes no pain; when present, the character of the pain is more like that of dysentery, and there is tenesmus. The stools are more granular, pappy, soupy, not lienteric, often grayish in color, and contain mucus. Colitis is generally associated with ileitis. Proctitis is characterized by frequency of stools, with great soreness and burning at the anus, with tenesmus and spasmodic contraction of the sphincters. The stools contain mucus and blood. There is usually pain and tenderness on pressure in the left iliac region. The rectum is sore and painful, as demonstrated by ma-

nipulation. There may be loss of power of the sphincters, with resultant discharge of fluid.

Taking intestinal catarrh as a whole, it can be recognized without difficulty. As pointed out, the resemblance of cholera nostras to *Asiatic cholera* is striking, but in a suspicious case bacteriological tests will establish the identity of the disease. *Typhoid fever* in its early stage can soon be recognized by the character of the fever and the appearance of the characteristic rose-colored spots. *Peritonitis* is much less painful, and the bowels are constipated. *Dysentery* is more violent, there is greater tenesmus, and the stools are much smaller.

Treatment of Catarrhal Enteritis.—Rest in bed is indispensable; in the great majority of cases total abstinence from food, with small pieces of ice to relieve thirst, is equally important. If the symptoms are due to the presence in the bowels of some offending substance, as unripe fruit or spoiled meat, it is the part of wisdom to insure its prompt expulsion by administering a full dose of castor oil or some smart cathartic. When the stomach has recovered tone sufficiently to bear food, bland substances only should be allowed, such as boiled milk, rice boiled very soft in milk, gruels made of barley or oats, and peptonized foods. Coarse bread must be forbidden; soft toast or Zwieback, softened in hot milk, may be eaten.

For the relief of pain, application to the abdomen of hot fomentations, mustard plasters or turpentine may be tried. Ginger, internally, often proves comforting. Morphia should not be administered save in extreme cases. Enemata of starch (2 ounces) and laudanum (20 drops) are soothing and harmless.

If there is duodenitis, counter-irritation over the right hypochondrium is advisable. Fatty foods and starch are prohibited. When the large intestine is involved, copious flushing of the bowel with warm water is excellent. In proctitis soothing local applications are almost indispensable. Suppositories of cocoa butter and extract of opium usually afford relief; injections of starch and laudanum are equally helpful. The insertion into the rectum of small pieces of ice is recommended by some clinicians.

In cholera morbus the question of diet does not come up for consideration until convalescence, and the food then allowed

must, of course, be bland and easily digested. The most urgent demand will be for relief from pain, which is quickest met by the hypodermic use of morphine. In my experience, the internal use of the homœopathic remedy is frequently effective in affording early relief, but the propriety of using morphia here cannot well be ignored. The craving for water may be satisfied by holding small pieces of ice in the mouth.

To avert collapse, the external use of heat is indicated, as in the form of poultices, fomentations or hot bottles to the surface of the body. Stimulants may be used when the stomach can bear them. The serious danger from the loss of fluids is met by copious injections of water into the bowels or, better, under the skin.

Chronic intestinal catarrh demands the utmost care in the selection of a proper diet and rigid enforcement of dietetic rules laid down. Boiled milk is almost universally suitable and should always be given a faithful trial. Starch-foods are to be used with great moderation. The exhibition of pancreatic extracts is advisable. Rest in bed is also of great importance. Osler relates a very tedious case cured by keeping the patient in bed and on a diet of milk and albumin water. Raw scraped beef, made palatable by mixing it with jelly, is highly valued by European practitioners, and often does excellently. If there is constipation, active cathartics must be scrupulously avoided and resort had to such waters as Hunyadi and Friedrichshalle.

In severe cases the same general rules are operative, and the necessity of rest in bed and an indefinitely continued diet of boiled milk, raw scraped beef, etc., is evident. Sugar, starch and fat are prohibited. When there is pus in the stool, it is advisable to inject small amounts of water, not to exceed one ounce, to which may be added from one-half grain to one grain of either sulphate of zinc, nitrate of silver or acetate of lead. A larger amount is not readily retained. Directions already given concerning the local treatment of proctitis are applicable in chronic enteric catarrh; in addition, irrigation of the rectum with a one or two per cent. solution of salicylic acid or boracic acid may be advantageously practiced. In the chronic diarrhœa with ulceration which follows dysentery Osler denies all merit of internal medication, urges a diet which leaves the smallest possible residue, and gives astringent enemata. "From

two to four pints of warm water containing from half a drachm to a drachm of nitrate of silver may be used. In giving large injections the patient should be in a dorsal position, with the hips elevated, and it is best to allow the injection to flow in gradually from a siphon bag. In this way the entire colon can be irrigated and the patient can retain the injection for some time. The silver injections may be very painful, but they are invaluable in all forms of ulcerative colitis. Acetate of lead, boracic acid, sulphate of copper, sulphate of zinc, and salicylic acid may be used in one per cent. solutions."

Therapeutics.—In the acute intestinal enteritis consult: ACONITE, ÆTHUSA, ALOES, ANTIMONIUM CRUDUM, APIS, ARGENTUM NITRICUM, ARSENIC, BELLADONNA, BRYONIA, CALCAREA CARBONICA, CARBO VEGETABILIS, CHAMOMILLA, CHINA, COLOCYNTHIS, CROTON TIGLIUM, DULCAMARA, HELLEBORUS, IPECACUANHA, IRIS, JALAPA, JATROPHA, KREOSOTE, MAGNESIA CARBONICA, MERCURIUS CORROSIVUS, MERCURIUS SOL. HAHN., NUX VOMICA, PHOSPHORUS, PODOPHYLLUM, PULSATILLA, RHEUM, PHOSPHORIC ACID, TARAXACUM, VERATRUM ALBUM.

In the chronic form: the above list; also GRAPHITES, LYCOPodium, PHOSPHORIC ACID, SULPHUR. In cholera morbus: ARSENIC, CAMPHOR, CUPRUM, SECALE, VERATRUM ALBUM, possibly JATROPHA, PODOPHYLLUM.

ACONITE. Acute form; from cold, getting wet, chilled, overheated, exposure to draught; from violent paroxysm of anger or from fright. Stools watery, green like chopped herbs; great heat in the distended abdomen.—ÆTHUSA CYNAPIUM. Infantile diarrhœa, with *forcible vomiting of milk as soon as swallowed*; the milk is curdled and cheesy. *Exhaustion* after vomiting; the child falls into a doze after vomiting, evidently from very weakness; stools light-yellow or greenish, lienteric, thin and watery; abdomen tense and sensitive; pulse small; convulsions. Summer diarrhœa; diarrhœa of dentition.—ALOEES. Pain and rumbling in the bowels before stool. Copious emission of intestinal flatulence, preceded by colicky pains low down. "The patient does not have a proper sense of the accumulation of fœcal matter in the rectum, and there is loss of power in the sphincter, so that the stool escapes easily, and when the desire for stool comes, the patient is scarcely able to attend to it" (T. F. Allen). Proctitis; hæmorrhoids.—ANTIMO-

NIUM CRUDUM. Gastric symptoms quite pronounced, though not intense; from overfeeding or from errors of diet generally, especially milk which is too rich. Vomiting excited by eating or drinking. *Tongue coated white, as though covered with skimmed-milk.* Frequent vomiting, chiefly of undigested food or milk. No thirst; cutting pain before stool; ill-tempered. Profuse lienteric diarrhœa. Brought on by drinking bad, spoiled beer.—APIS. Of service in very bad, far advanced cases, in infants, *with a preponderance of brain symptoms* (grinding of teeth; sopor; cephalic cry, etc.) overshadowing all else; stools watery, greenish-yellow; abdomen distended; urine scanty.—ARGENTUM NITRICUM. Especially useful in chronic cases. Diarrhœa even after slight excitement. Stools green, like spinach; mucous; fetid. *Persistent flatulency* and nervous irritability are always present, with enormous distension of the abdomen.—ARSENICUM. Diarrhœa after very cold drinks, from eating ice-cream; usually with symptoms of gastric catarrh. Characteristic restlessness and thirst, drinking often, but little at a time; drinking and eating provoke vomiting. Stools green, slimy, mucous; watery; dark-colored; bloody; offensive, like carrion; painless; acrid; involuntary; sometimes with burning in the anus and rectum. *Rapid loss of strength, even though the severity of the attack does not seem to justify it.* In severe attacks with rapidly progressing exhaustion, and in the late stages, when the condition of the patient justifies grave apprehension as to the results. *Burning* pain in the stomach and abdomen. Abdomen distended and painful; stools acrid, dark, grumous, offensive, of cadaverous odor; involuntary; pulse quick and irregular; characteristic fever, restlessness, thirst; thinks he will die. Face haggard, hippocratic; surface of the body hot and dry, burning or cold, but with a sense of internal burning heat. Worse after midnight. In the late stage of cholera morbus, with *burning* and cutting pain in stomach and abdomen, with intolerable restlessness, apprehension, anguish. Superficial breathing; weak, almost imperceptible pulse; icy coldness of surface; sense of burning heat within. Lips and tongue dry, black, cracked, bleeding. Stools like rice-water; profound prostration.—BELLADONNA. Characteristic tendency to *congestion* and delirium. Great distension of the abdomen, with sensitiveness to touch, pressure or

jar. Stools of green mucus, containing lumps like chalk.—**BRYONIA**. In the bilious diarrhoea of hot weather. Tongue thickly coated white; thirst for large quantities of water; soreness and sensitiveness of the abdomen; stools bilious and intensely irritating; diarrhoea alternating with constipation of large, hard, dry stools. Pressure in the stomach after eating, as from a heavy load or stone. Headache; irritability. Useful in the diarrhoea occurring when the days are very hot and the nights cold; when there is a sudden dropping of temperature, as after a thunder-storm. In children when the stools are light, undigested, painless, preceded by slight colic.—**CALCAREA CARBONICA**. Chronic diarrhoea and diarrhoea of dentition, especially of fair-complexioned, fleshy children of lymphatic temperament, with characteristic constitutional indications. Abdomen hard as a brick; distended; stools chalky, lienteric, white, sour, smelling like rotten eggs; first hard, then pasty, then liquid. Natural tendency toward chronicity, with emaciation.—**CALCAREA PHOSPHORICA**. Chronic cases in infants and old people, with desire for indigestible things; gastric catarrh; pyrosis; uneasiness in the abdomen, especially about the navel, relieved by passing flatus. Stools offensive.—**CAMPHOR**. Cholera morbus. Attack very sudden, with tendency to collapse well marked from the start; vomiting and purging may be comparatively light or even wanting. Prostration excessive; face pale, livid; eyes sunken and fixed; lips drawn up, exposing the teeth. During the season of the year when diarrhoeas are most common it is often possible to abort an attack by the prompt administration of a few drops of the saturated alcoholic solution of camphor.—**CUPRUM**. In cholera. It covers the intense colic and cramps in the stomach and abdomen and the cramping of the muscles, especially in the calves of the legs. The stools are not large; there is great desire for warm drinks and food, which are swallowed with a gurgling noise. The intensity of the pain and the cramps, extorting violent screams, are the most pointed indications.—**CARBO VEGETABILIS**. Given in large doses, it is often useful when there is much gastric and intestinal flatulency, with the feeling, on part of the patient, that this constitutes the chief trouble. Also valuable in the diarrhoea of low fevers, with symptoms of collapse. The stools are brown, yellow, slimy, involuntary. Here the high poten-

cies must be given.—**CHAMOMILLA.** Summer diarrhœa of children, including catarrh from eating indigestible food. The child is peevish and fretful and wants to be carried constantly, evidently obtaining relief from it; it cries all the time unless carried. Stools watery, greenish, like chopped or scrambled eggs, small, hot, frequent, excoriating, and smelling like rotten eggs. Colic before and during stool; better after stool.—**CHINA.** Diarrhœa with gastro-duodenal catarrh. Dyspepsia, with anorexia; cannot bear to think of anything to eat, with occasional craving for sour, pungent things and for stimulants. *Feels dull, stupid, sleepy after eating*; unequal to any exertion of body or mind. Gastric acidity and flatulence, with no relief from belching gas. Tongue coated thick yellow; headache; abdominal distension with constant rumbling of gas, without relief from the emission of flatus. Stools are undigested, occur soon after eating, and are of cadaverous odor. Diarrhœa from eating fruit; diarrhœa of debilitating diseases.—**COLOCYNTHIS.** *Severe, griping, twisting colic*, hard, pressive, intense, the pain shooting in various directions, making him double up, worse from hard pressure, better after stool. The diarrhœa is not so characteristic; usually copious, yellow, frothy, worse from eating or drinking.—**CROTON TIGLIUM.** Summer diarrhœa; *gushing*, the stools escaping as though from a hydrant; yellow, dirty-green or brown. Diarrhœa of nursing infants; worse after eating or drinking.—**DULCAMARA.** Yellow, watery diarrhœa, with tearing-cutting before stool, as after taking cold. Worse during cold, wet weather. "Stools mucous, green, changeable, of sour odor, with general dry heat of the skin." T. F. Allen.—**GRAPHITES.** Not often indicated in the acute, but very useful in the *chronic*, form when there are large, constipated stools, covered with mucus. There is usually gastric catarrh, with considerable pain in the lower abdomen, increased by eating.—**HELLEBORUS.** Like **APIS**, of value chiefly in bad cases of infantile diarrhœa, rendered serious from cerebral involvement. There is distension of the abdomen, with gurgling in it as though water were poured from a bottle. The stools are jelly-like, looking like frog-spawn, often accompanied with tenesmus. Coldness of the face; cold, clammy sweating; pulse thread-like; boring of the head in the pillows; sopor; suppression of urine.—**IPECACUANHA.** Of great value in the diarrhœa

of children, especially in early fall, provoked by eating unripe fruit and vegetables. Constant sickness at the stomach and vomiting of green, jelly-like mucus. Stools grass-green, fermented. Gripping colic.—IRIS VERSICOLOR. Stools profuse, thin, watery, bilious, *corrosive*. Great burning at the anus, as if on fire; vomiting of excoriating, acrid fluid; vomiting of sour milk in children. Severe cutting colic.—JALAPA. Chronic diarrhœa of six or eight stools per day; dark, offensive, like gruel, with much griping and some tenesmus.—JATROPHA. Warmly recommended by T. F. Allen as an extremely valuable remedy, used too little, for profuse, gushing, watery diarrhœa, sometimes associated with coldness of the body and unquenchable thirst, frequently with rumbling and gurgling in the abdomen, at times with vomiting of large amounts of albuminous-looking substance. It closely resembles VERATRUM ALBUM, but, as a rule, lacks the violent pain of that drug.—KREOSOTUM. Irritability of the stomach; nausea and vomiting after eating, with soreness at the pit of the stomach. Persistent vomiting of infants. Stools undigested, dark-brown, offensive. Great restlessness. Diarrhœa of typhoid fever.—MAGNESIA CARBONICA. Infantile diarrhœa. Stools green and frothy, like the scum of a frog-pond. White masses like lumps of tallow float on the surface. Sour eructations and vomiting.—MERCURIUS CORROSIVUS. In proctitis, with pronounced dysenteric symptoms. Not indicated save when there is intense inflammatory action or phagedenic ulceration. Violent burning pain in the abdomen, but especially in the rectum and anus; stools frequent but small; of mucus and blood, with oozing of excoriating ichorous fluid from the anus; very great tenesmus; lies on his back with knees drawn up; small, irregular pulse; cold, clammy perspiration.—MERCURIUS SOL. HAHN. (or MERC. VIVUS). Duodenitis. Abdomen hard, distended; great sensitiveness and soreness in the right hypochondria. Stools slimy, dark-green, acrid, bloody, with straining; *cutting pain, as though from knives, in the abdomen*. Tongue soft, flabby, coated whitish or yellowish. Jaundice.—NUX VOMICA. Diarrhœa alternating with constipation; from high-living, abuse of stimulants and irritating drugs. Constant and ineffectual urging to stool; severe sore, lame backache; stools frequent, small, offensive, dark-colored. Feeling in the rectum as though “not done,” after a stool.

Bruised, sore pain in the rectum.—PHOSPHORUS. Frequently of great value in the chronic form, or in diarrhœa associated with wasting disease or of cachectic origin, with much exhaustion of the vital forces and emaciation. The presence of little lumps like fat on the stool is one of its best indications. Watery, painless diarrhœa, usually worse in the morning after getting up; sometimes it is gushing and copious; or purulent, with oozing from the rectum.—PHOSPHORIC ACID. White, copious stool, painless, with considerable rumbling in the bowels. Its characteristic lies in the fact that the patient, though sick for some time, does not appear to lose flesh or strength. Very valuable in the treatment of painless summer diarrhœa during epidemics of cholera.—PODOPHYLLUM. *Morning diarrhœa*, from 3 to 9 A. M. Painless, watery, with sediment like meal. Profuse, gushing, yellow, offensive; stools change constantly in appearance. Duodenitis. Sometimes stool preceded by violent colic. In hot weather, during dentition. Camp diarrhœa. Prolapsus ani. The intensity with which PODOPHYLLUM acts justifies its exhibition even in cholera morbus.—PULSATILLA. Often useful in the milder forms of diarrhœa of women and children when there is gastric catarrh of a mild character, persistent, but not very severe, nausea and sometimes vomiting; shifting pain in the abdomen, relieved by the external use of warmth; constant change in color and character of the stools. Thought to be particularly indicated when resulting from eating indigestible rich food, as pastry, and from eating ices or drinking ice-water. The tongue is coated white; there is loss of appetite; regurgitation of food takes place a long time after eating. The entire process of digestion seems tardy and delayed. Children have colic about the navel, with evening aggravations and chilliness, nausea and vomiting.—RHEUM. Not used as often as its merits warrant. *Sour*, liquid, slimy, green stools, like chopped eggs. Cannot bear to be uncovered; feels worse if an arm or leg is uncovered. *Sour* sweating. *Sour*-smelling diarrhœa, preceded by colic; diarrhœa with colic and tenesmus, alternate chills, heat and thirst, with much (sour) sweating and weakness.—SECALE. Cholera morbus. Watery diarrhœa, sudden in appearance, with vomiting, unquenchable thirst, suppression of urine, and collapse. *Icy cold, but cannot bear to be covered*.—SULPHUR. Diarrhœa of thin, watery stools, usually fetid and

varying in appearance. Mucous diarrhœa, sometimes with streaks of blood; imperative urging to stool; child passes the stool in bed because it cannot get up quick enough. Offensive odor about the child; the smell of the stool clings to it as though it had not been properly cleansed. Aversion to being washed. Of value chiefly in cases of a marked scrofulous diathesis, tending toward slow recovery and chronicity. The characteristic constitutional indications rather than the local symptoms determine the choice of the remedy.—TARAXACUM. A neglected remedy, freely and successfully used by the peasants of Germany in *bilious* diarrhœa, with bitter taste, heavily coated and mapped tongue, headache of a pressive character, with sense of soreness, shivering, and general malaise.—VERATRUM ALBUM. The *violence* of the pain and the *simultaneous occurrence of vomiting and purging* are its most reliable indications. Retching and vomiting are intense. The stools are very profuse, watery, sometimes blackish, and followed by extreme prostration. The pain in the abdomen is agonizing, usually beginning in the stomach and extending upward to the shoulders and downward involving the entire abdomen. Collapse. Of great value in cholera nostras.

E. M. Hale calls attention to the usefulness of GERANIUM MACULATUM ("a few drops of the tincture frequently repeated will cure chronic diarrhœa in a few days or weeks"), and to the root of RUBUS VILLOSUS (blackberry) and RUBUS CANADENSIS (dewberry), in doses of 10 to 20 drops of the tincture of the root. He also recommends NAPHTHALIN (one-tenth of a grain to three grains) three times daily in chronic diarrhœa.

ENTERITIS IN CHILDREN.

The various forms of enteritis in infants and children correspond pathologically and symptomatically to similar lesions in the adult, but are sufficiently modified by the special environments of infancy and early childhood to demand separate consideration.

Ætiology.—In all cases errors of diet are important ætiological factors. These errors, though serious in their consequences, may at first glance appear trifling, but the sensitiveness of

children and the comparative weakness of their digestion render them very liable to derangements of the stomach and bowels. Thus, a thriving, breast-fed child of a healthy mother may quickly and severely suffer from changes effected in the mother's milk by a fit of anger which was passing and scarcely worthy of serious attention. Children artificially fed are peculiarly handicapped in that the articles which constitute their daily food are constantly liable to chemical changes and to influences which render them poisonous rather than life-sustaining. A moment's consideration of the difficulty of securing cow's milk which answers every demand and of the repeated trials often necessary to determine the exact manner in which the individual infant can easily and fully assimilate it, is quite sufficient to prove this. And when there is added the almost impossibility during certain seasons of the year of maintaining the purity and freshness of this one article alone, it is readily understood why Holt's tables of 1943 fatal cases of enteritis in infants shows that 97 per cent. of these were artificially fed children.

Children between six and eighteen months old are especially liable to enteritis; this applies particularly to infants whose surroundings are insanitary and who, through poverty and ignorance of their parents, are neglected. The children of the well-to-do are by no means safe, but their chances to escape serious trouble are infinitely better.

By far the larger number of cases of diarrhoea among infants and young children occur during the hot season of the year, beginning in May, growing worse in June, with a maximum of illness and mortality in July and August, materially lessened in September, and practically disappearing with the beginning of cold weather. To what extent the heat alone is responsible for this showing it is difficult to state, for children in the country, where the temperature may be quite as high, suffer very much less than do city children from this great danger to child life. It must, however, be remembered that the heat of a city is especially exhausting because there is in closely built large towns an absence of refreshing currents of air and of shaded, breezy places in which the country abounds. When we add to the state of depression resulting from this cause alone the general effects of that foulness and filth which prolonged summer heat

brings to all large places, and which are responsible for the annual exodus into the country and to the seashore of those who can afford such a luxury, we scarcely need the effects of toxin-laden milk to account for the lessons of the mortality tables. It is in view of these facts that the various charities which provide for the infants of the poor a temporary home in some shaded farm house, or near the seashore or some lake, or daily trips on a river boat, in addition to pure, wholesome milk, have proved blessings to thousands of little ones who without them could not have escaped illness and death.

Among predisposing causes special importance attaches to dentition, to feebleness of constitution and to inherited taints; thus, scrofulous, rickety children, even amid the most favorable surroundings, are prone to the various forms of enteritis. Diarrhœa of more or less severity also occurs in connection with infectious fevers and as the result of other exhausting diseases.

Booker, Jeffries, and others, have studied the relation of bacteria to enteritis of children, with the conclusion that "their action is manifested more in the alteration of the food and intestinal contents and in the production of injurious products than in a direct irritation upon the intestinal wall."

Pathologically enteritis consists of hyperæmia and swelling of the intestinal mucous membrane, with enlargement of the lymph follicles; in other forms, of follicular erosion and ulceration; more rarely of croupous inflammation of the lower ileum and colon.

Clinically the following forms are recognized: acute dyspeptic diarrhœa; cholera infantum; acute entero-colitis; chronic diarrhœa.

Acute dyspeptic diarrhœa is by far the most frequent of the summer diarrhœas of infants. It is due to causes already enumerated. Errors in diet stand first in importance, and among them mention may be made of feeding infants miscellaneous articles which happen to be on the table, under the impression that "it will do them good;" in older children the affection is often brought on by eating unripe fruit and vegetables or too freely of ripe fruit; it also occurs at the onset of specific fevers of children.

The symptoms are those of gastric and intestinal irritation of varying degrees of intensity. If the attack is light, there is

moderate diarrhœa of rather offensive stools, containing curds of milk, but not in any sense characteristic, accompanied with some uneasiness and slight pain in the bowels; little, if any, fever; the appetite is somewhat deranged, vomiting not at all or infrequent, and little thirst. The child may pass all night without having a movement, and its condition excites no uneasiness whatever. This continues for a few days, with gradual recovery, even without medical treatment.

In the severe type the onset of the affection is sudden and violent, with vomiting, diarrhœa and fever. The latter may be high, reaching 104° , or more; when the fever is high, convulsions are not uncommon. There is much colicky, griping pain, especially before stool; the abdomen is distended, sensitive to pressure; the child lies with its legs drawn up, evidently seeking relief from pain by relaxing the abdomen. The stools are grayish, greenish-yellow, sometimes sour and yeasty; they contain curdled milk and particles of food if the child is old enough to take food other than milk. Mucus and slight tinges of blood are occasionally seen. Improvement and uneventful recovery usually take place in a few days. If complications arise, such as entero-colitis, or when the patient is of a constitution so enfeebled that he succumbs to slight causes, the case may terminate fatally. Relapses are common and not free from danger, since each successive attack not only weakens the child, but increases the tendency to a more serious form of intestinal affection.

Cholera infantum is much less frequent, but infinitely more dangerous, corresponding to the cholera nostras of adults. Holt states that it occurs in only two or three per cent. of all the cases of summer diarrhœa of infants. The causes are those of enteritis in children. It may follow cases of imperfect recovery from acute dyspeptic enteritis. The chief symptoms are vomiting and purging, with early and profound exhaustion and pronounced tendency to collapse.

The onset of the disease may be sudden or assume the form of an active diarrhœa, growing worse rapidly and associated at an early stage with vomiting. The vomiting, as in cholera morbus, is violent, almost incessant, and forbids taking either food or drink, which are ejected as soon as they reach the stomach. The stools are frequent and large, consisting at first

of fæcal matter; soon they become thin and watery, of brownish or yellow color; later serous, like dirty water, and of alkaline reaction. At first they are offensive and they may remain exceedingly foul throughout the course of the attack; in other cases they lose this foulness and become practically odorless. Great prostration is marked from the beginning and is unmistakably expressed even in young infants. In the early stage there is aggressive restlessness and excitement; but this soon yields and the child falls into a semi-conscious, stupid state. The tongue at first is coated, and there usually is considerable fever, the thermometer showing a temperature several degrees higher in the rectum than in the axilla. The child suffers much from thirst, and greedily clings to any vessel containing water, but vomits as soon as a few drops are swallowed. The urine is scanty and the pulse rapid and full in the early stage, growing weak and irregular as the case progresses. The appearance of the child is striking. The face is pinched; the eyes lustreless; the fontanelle sunken; the surface of the body pale and cold; it lies stupid, lifeless, with dry tongue, parched lips and scarcely perceptible pulse.

A favorable turn of the case is indicated by lessening of the vomiting and diarrhœa and by the occurrence of lengthening periods of quiet, restful sleep.

In fatal cases all these symptoms may develop with startling rapidity, and death may occur, usually preceded by a sharp rise of temperature, within twenty-four hours. In others, the vomiting and diarrhœa cease, and the child passes into that condition which Marshall-Hall described as "hydrecephaloid" or spurious hydrocephalus, the little one lying in an almost comatose condition, with clinched hands and fingers, sometimes general convulsions, head thrown back, with shallow, irregular, sighing breathing, suppressed urine, rolling of the head in the pillow, probably due to the constitutional action of the toxin absorbed from the intestine.

The diagnosis of cholera infantum is easily made because the symptoms are unmistakable and characteristic.

The prognosis is serious, and is rendered unfavorable by the presence of hyperpyrexia, uncontrollable vomiting, and symptoms of profound nervous prostration.

Acute entero-colitis (follicular enteritis, follicular dysentery) is

that form of diarrhœa which is so common and fatal in the second summer of child-life. It is rare after the third year has passed. It is seen as a complication of the specific fevers of childhood, and may follow an attack of dyspeptic diarrhœa or cholera infantum.

The essential pathological features of the disease are swelling and softening of the affected mucosa, with enlargement of the solitary and agminated glands, terminating in erosion and ulceration of the follicles, which may enlarge and coalesce, giving rise to sloughing which may involve the muscular structure of the intestinal wall.

Symptoms.—Light cases present the symptoms of an acute dyspeptic enteritis in which almost imperceptibly the diarrhœa has changed to mucous, blood-streaked discharges, with a decided and nearly continuous elevation of temperature and an evidently unfavorable turn in the case. The stools are frequent, from ten to twenty or thirty in the twenty-four hours, small, acrid, offensive. There may be some intestinal uneasiness and even tenesmus, but often there is little pain or straining. Vomiting at first may be pronounced, but usually ceases after a time. There is abdominal distension, with tenderness along the line of the colon.

If the case is severe, the intestinal symptoms bear a close similarity to dysentery. The onset is sudden, with high fever and, possibly, convulsions. Vomiting, with diarrhœa which at first is fœcal and offensive, then consists of small mucous and bloody stools, accompanied with straining and intense inflammatory pain in the bowels and great prostration. The urine is scanty and rich in urates; appetite is lost, nutrition impaired, and the general appearance of the child emaciated, haggard and worn.

In the lighter form gradual improvement in the frequency of the stools and in the character of the diarrhœa and general condition of the patient lead to recovery in two or three weeks; or the case becomes subacute, and then drags along for an indefinite period, slowly undermining even a strong constitution, terminating in eventual tedious recovery or death from exhaustion or some intercurrent malady. The severe form may prove rapidly fatal, but usually runs for a week, or two.

The diagnosis rests upon the presence of mucus and blood in

the stool and the character of the fever, which distinguish this affection from acute dyspeptic enteritis and cholera infantum.

The prognosis must be guarded. Recovery in even the milder forms is rarely prompt and complete, depending largely upon the age of the child, its previous history as to good health, habits and surroundings, and the manner in which it has been fed. Tendency to relapse is always great.

Chronic diarrhœa of children. When a case of intestinal catarrh has run for a period of six weeks, it is considered chronic; diarrhœa from tuberculosis is not here included. It is a frequent and serious affection, especially in children less than two years of age. It naturally divides itself into two types: the form in which the pathology and symptoms are those of a purely catarrhal involvement, and the form in which are found the anatomical changes and symptoms of entero-colitis.

The causes are: repeated attacks of intestinal catarrh; persistent disregard of the rules which should be observed in feeding and of the laws of health generally; inherited weakness of constitution; predisposition and taint, as shown in the scrofulous or syphilitic taint and in rickety subjects. Age is of importance in so far as children less than two years of age furnish by far the greater number of cases.

Symptoms.—The symptoms of chronic diarrhœa are chiefly those of gradual decline of the acuteness of an attack of enteritis, with continued, but more moderate, diarrhœa, persistent innutrition, loss of flesh and strength, and undermining of the general health. Exceptionally the case may practically be chronic from the start, the symptoms at no time threatening danger from their severity, but rather from their unwillingness to yield to such methods of treatment as would usually be successful.

The chief symptoms are: diarrhœa, innutrition, failure of general health. Symptoms of gastric catarrh, if present, are inconsiderable, and there may be an excellent appetite and entire absence of nausea and vomiting. The diarrhœa, after the case has become decidedly chronic, may consist of not more than four to six stools daily, of soft, mushy consistency, with every possible variety of coloring; but the frequency of stools varies, and may be great. At any time an acute exacerbation may result from exposure, or error in diet, or from relapse; then

the case at once assumes the characteristics which belong to that form of acute enteritis of which it is the chronic expression. During such intercurrent acute attacks the character and frequency of the stools at once changes materially. Almost always the ingestion of food is followed by increased peristalsis and stool. Colicky pain of moderate severity and distension of the abdomen, with some flatulency and fever, may be present, but as a rule there is slight, if any, pain or fever after the case has become chronic.

The constitutional symptoms which arise from innutrition are striking. There is constant loss in weight and strength; the child becomes listless, pale, old-looking; the fontanelle is sunken, the skin dry, wrinkled, harsh; the pulse rapid and weak; urine scanty. The child is fretful, peevish, irritable, restless both night and day, and often presents a pitiful picture of general wretchedness.

The older the child and the greater its vitality, the lighter will be the symptoms and the greater the probability of eventual recovery.

The duration of the disease is indefinite, from a few months to a year. It is influenced largely by the judgment exercised in behalf of the child and by such outside conditions as the state of the weather, the presence or absence of extreme heat, and success in preventing exacerbations.

But the prognosis is always serious, death usually occurring from exhaustion or from an intercurring acute attack of enteritis or from some complication, as broncho-pneumonia. Of course, the longer and the more persistent the course, the more serious the outlook, particularly in children less than two years of age and of an inherited dyscrasia.

Gee has described a form of diarrhœa in children which resembles the diarrhœa of tropical countries, and which he calls "the coeliac affection" (diarrhœa alba, *seu* chylosa). It is seen in children from one to five years of age, and is characterized by large, frothy, yeasty, exceedingly offensive stools of pale, whitish color, with doughy, inelastic abdomen, usually some flatulency, and progressive wasting, weakness and pallor rarely with fever. It begins insidiously, is lingering, and usually fatal. It is not associated with tuberculosis or hereditary disease.

Treatment of Enteritis in Children.—The successful treat-

ment of all the forms of diarrhoea seen in infants depends quite as much upon close attention to hygienic and dietetic measures as upon intelligent medication.

The very first care of the physician should be to insure to small children an abundance of pure, fresh air. Valuable as this is as a preventive, it is imperative when summer complaint has actually appeared. The little patient should at once be taken into the country, to the mountains, to the seashore—to any place where there is a generous supply of cool, fresh, pure air. The child should be kept in this ocean of health-giving, bracing atmosphere without reference to the convenience of others, to be taken in-doors only with the approach of night or when rendered necessary by the condition of the weather. There is no nobler charity than that which provides for this need of the children of the poor in large cities, whether by arranging for daily visits to a farm-house or for long-continued rides on a lake or river-steamer. When all these are beyond reach, a compromise must be made by placing the sick child in a perambulator or baby-carriage of some sort, kept at a slow motion in the open air. This passive motion is not only harmless but directly helpful, and if properly protected against the rays of the sun, the child will thus obtain rest which in the stifled temperature of a close room and in the arms of a nurse would be out of question.

Cleanliness in the fullest sense of the word goes far as a preventive and aids wonderfully in the cure of diarrhoea. Reference is made not only to the general habits of life, but to the various acts connected with the infant which are likely to be overlooked, even by mothers of average intelligence. Here, for instance, belongs the care of vessels in which the food is prepared or which are used in feeding the infant. A foul bottle or a dirty spoon may more than offset the best judgment used in the selection and preparation of the food. Another item is the proper care of the diapers, which should never be left in the sick-room or near the child, but should be removed as soon as soiled, and promptly washed. In fact, it is something more than a whim to insist that the nurse shall thoroughly disinfect her hands after changing the napkin or even wiping the sick baby. The diet certainly demands the utmost care. First of all we must remember that during the first twenty-four hours

of an acute attack of enteritis all feeding had better be suspended, the patient being allowed nothing but water or a little toast-water. After that, the suitable diet having been selected, feeding must be had at stated times, every one to four hours, according to the age and needs of the child, taking pains to rather feed little at a time and often than to feed more generously at longer intervals. A point almost equal in importance is to recognize at once the fact that very many of the prepared foods of trade, and especially the meat extracts, are of slight value when compared with the foods which are easily prepared at home.

Since the vast majority of cases of diarrhœa occur in hand-fed children, the first symptoms of enteritis, usually of the dyspeptic form, must be the signal for a thorough inquiry into the diet of the little one and the correction of errors made. Even when breast-fed it is necessary to determine if the health of the mother or her present condition may not be responsible for the illness of the baby. If this is found to be the case, a wet-nurse should be provided, if one can be found possessing the necessary qualifications. When this cannot be done, the patient must at once be put upon an artificial diet selected with reference to the special needs of the case. Escherich advises that albuminous foods be withheld and carbo-hydrates (dextrine, sugar and milk) be given when the stools are foul and offensive from decomposition; and that an albuminous diet (egg-albumen and meat-broths) be prescribed when there is acid fermentation with sour but not fetid stools. If milk is used, it should be carefully selected and sterilized; in large cities a first-class brand of condensed milk or of malted milk is for many reasons the safest. But in nearly all cases it is wise to drop milk until the patient has recovered.

Egg-albumen is easily prepared by beating the white-of-egg in a few tablespoonfuls of distilled water, adding a little salt and a few drops of brandy, if the latter is desired. Meat-broths must be prepared from day to day. Good lean steak, raw or slightly broiled, is finely chopped and the juice expressed by means of a lemon-squeezer. This is heated and fed. Or a pound of lean mutton, chopped or minced, may be placed in a jar, covered with a pint of water; let it stand for three or four hours in a cool place, then boil slowly for three or four

hours, skim off the fat, add a little salt, and feed hot or cold. These are easily made, and much better than the prepared foods which flood the market.

Drink may usually be given with considerable freedom, either of pure (distilled) water, or crust-coffee, or barley-water.

When the diarrhœa is under control, the return to a milk-diet—sometimes milk-whey—must be gradual and cautious; the stools should be examined regularly, to determine if the diet agrees with the child.

Throughout the attack it is advisable to use daily inunctions of olive oil or cod-liver oil. They are soothing, cleansing, and nourishing to an extent which is not generally appreciated.

Hyperpyrexia at any time demands the use of a bath in water at a temperature of about 80° F., to which cold water may be added slowly in due time. Some practitioners by preference use the wet pack, but for many reasons the bath, repeated as often as may be necessary, is the better. Convulsions may demand the use of cloths wrung out of cool water applied to the head, changed frequently. Ice to the head is urged by some, but appears to me uncalled for and dangerous.

In the treatment of *cholera infantum* the rules of diet and other general directions already given must be faithfully observed. If the temperature of the body is taken, the instrument must be used in the rectum. The loss of fluid, which here, as in cholera morbus, is an important consideration, may be met by copious irrigation of the stomach and intestine. Victor C. Vaughn insists upon repeated washing-out of stomach and intestine to free the system from the specific poison introduced by means of the milk eaten, which he considers the exclusive cause of this disease ("acute milk-infection"). "The bowels should be thoroughly irrigated with warm water and castile soap, not less than a gallon of water being used. After the large intestine has been cleansed in this manner, an injection of cool water, containing 15 to 30 grains of tannic acid to the pint, should immediately follow. Some of the poisons formed are, as we have seen, proteids which we have precipitated by tannic acid, but until the great mass of proteid in the large intestine has been removed no good can be expected from this agent. The object of the tannic acid irrigation is to render inert any soluble poisonous proteids which may remain in the

intestines after the first washing. The stomach should be washed with warm water containing a teaspoonful of common salt to the pint. After this organ has been thoroughly cleansed, from three to five grains of calomel should be administered. These irrigations should be repeated as soon as the vomiting or purging returns. * * * * * After the vomiting has been allayed by irrigation, stimulants may be given by the mouth" (Starr's Amer. Text-book of Diseases of Children). This treatment is based upon laboratory experiments rather than clinical experience.

Small injections of starch and laudanum are serviceable.

Entero-colitis requires the same general directions as to diet, consisting chiefly of broths, albumin-water, or yolk of egg cooked for hours, until thoroughly mealy. Flushing of the rectum is exceedingly valuable, using for this purpose a small flexible catheter or rubber rectal tube connected with a fountain syringe. A large amount of water, from three to four quarts, should be used, to which may be added a few drachms of borax or hamamelis (1 to 10 of water). Cloths wrung out of hot water may be applied to the abdomen. Pepper strongly recommends enemata of clear water; then medicate with "from 2 to 6 ounces of a solution of tannic acid (5 grains to 1 ounce), nitrate of silver ($\frac{1}{2}$ to 1 grain to 1 ounce), followed by a large enema of salt solution or by a mixture of bismuth in mucilage ($\frac{1}{2}$ drachm to 1 ounce)."

Chronic diarrhœa demands unremitting attention to diet and efforts to secure healthful surroundings. Peptonized foods may prove helpful, and if there is fat in the stools, pancreatin or pancroboilin may be used. Inunctions with oil and sponge-baths are of great value, but must be practiced systematically and perseveringly.

Therapeutics.—For *Acute Dyspeptic Enteritis*: ACONITE, ÆTHUSA, ANTIMON. CRUDUM, ARGENTUM NITRIC., BELLADONNA, BISMUTH, BORAX, BRYONIA, CALCAREA CARBON., CHAMOMILLA, CHINA, COLOCYNTHIS, CROTON TIGLIUM, FERRUM PHOSPHORICUM, GUMMI GUTTI, IPECACUANHA, JALAPA, JATROPHA, MAGNESIA CARBONICA, PHOSPHORIC ACID, PHOSPHORUS, PODOPHYLLUM, PSORINUM, RHEUM. For *Cholera Infantum*: ACONITE, ÆTHUSA, APIS, ARSENIC, BELLADONNA, BISMUTH, CALCAREA PHOSPHORICA, CAMPHOR, CROTON, CUPRUM, GUMMI GUTTI,

HELLEBORUS, IPECACUANHA, JATROPHA, PODOPHYLLUM, SECALE, TABACUM, VERATRUM ALBUM. For *Enterocolitis*: ACONITE, ALOES, ARSENIC, MERCURIUS SOL. HAHN., PHOSPHORUS, RHUS TOXICODENDRON. For *Chronic Diarrhœa*: ARSENIC, CALCAREA CARBONICA, CALCAREA PHOSPHORICA, FERRUM PHOSPH., IODINE, PHOSPHORUS, PSORINUM, SULPHUR.

Consult also the list of remedies under "Enteritis."

ACONITE. At the beginning, with characteristic fever, restlessness, anxiety, thirst. Diarrhœa green, watery. Violent colic, as from inflammation. Choleraic discharges, with collapse and characteristic restlessness.—ÆTHUSA CYNAPIUM. Violent vomiting of large chunks of curdled milk. Diarrhœa of curdled milk. Stools bilious, light-yellow, greenish. Spasms.—ALOES. Loss of power in the rectum; flatulency; diarrhœa of jelly-like lumps; intense pain and soreness after stool.—ANTIMONIUM CRUDUM. After nursing, vomiting of milk in little white curds; child refuses to nurse afterwards. Cannot bear to be touched or looked at.—APIS. Watery, yellow diarrhœa, sometimes painless. Stools dark, fetid, worse after eating. Chronic diarrhœa. Tenderness of the abdomen, even when it is not swollen. Stools involuntary, from every motion. Great stupor; refuses to eat or drink. Cholera infantum, with hydrocephaloid symptoms. Suppression of urine.—ARGENTUM NITRICUM. Stools green, mucous, like chopped spinach, usually with great flatulence; of shreds of mucus and undigested food; very offensive, with enormous distension of the abdomen and escape of much flatulence. Dysenteric stools, containing shreds of mucus. In children who are fond of sweet things, even during their sickness.—ARSENICUM ALBUM. Gastric catarrh and irritability. Catarrhal enteritis. Diarrhœa accompanied with restlessness, thirst, vomiting, great prostration. Stools watery, scant, dark, sometimes bloody; followed by great exhaustion. Worse after midnight.—BELLADONNA. Much nausea and vomiting. Abdomen hot and sensitive to touch and jar. Dysenteric stools, green and mixed with blood. Brain-symptoms. Convulsions, with red, congested face; drowsiness, with startings, dry heat and frequent vomiting.—BISMUTH. Painless diarrhœa with great thirst; cholera infantum, with tongue thickly coated white; cadaverously smelling stools. Vomits water, but retains food.—BORAX. Offensive diarrhœa of

nursing infants, preceded by colic; great dread of all downward motion or rocking; screaming before urinating; stools mucous; aphthous sore mouth.—*BRYONIA*. Lips, mouth, throat dry; very great thirst. Gastric irritability, with vomiting of food and sensitiveness to touch in the pit of the stomach. Summer diarrhœa, especially from errors in diet, children being allowed too much fruit and vegetables. Stools fœcal, undigested, smelling like rotten cheese. Worse from motion.—*CALCAREA CARBONICA*. Child backward; malnutrition; flabby, weak, sluggish; profuse sweating; cold extremities; delayed dentition. Diarrhœa of undigested food, copious, sour, fetid. Chronic diarrhœa, with ravenous hunger, distension of the stomach and soreness to touch. Vomiting of milk in curdled lumps. Cholera infantum.—*CALCAREA PHOSPHORICA*. "Cholera infantum, with great desire for undigestible things, like ham, smoked meats, etc. Abdomen sunken, flabby; emaciation; stools green, undigested, forcibly expelled" (T. F. Allen).—*CAMPHOR*. Cholera infantum with collapse; sudden and violent vomiting and diarrhœa. Vomiting and diarrhœa suddenly ceases and the child lies almost unconscious, with blue hands and feet, etc.—*CHAMOMILLA*. Diarrhœa of dentition; stools green, slimy, mucous; mixed white and yellow, looking like scrambled eggs; watery, undigested; offensive, smelling like rotten eggs. Wants to be carried about all the time; keeps still only when being carried. Colicky pains, especially before stool.—*CHINA*. Stools undigested, chocolate-colored, blackish, frothy, cadaverous; worse every time the child is fed. Colic; distension and fermentation in the bowels; frequent emissions of fetid flatulency. Great weakness.—*COLOCYNTHIS*. Chiefly indicated by its severe griping, squeezing colic, with soreness in the abdomen, and frothy, yellow, liquid, slimy stools, containing undigested food, mucus and blood. Moderate tenesmus.—*CROTON TIGLIUM*. Yellow, watery stools, suddenly and forcibly expelled, with prompt aggravation from drink and food. Not always pain with the stool.—*CUPRUM*. Violent spasms and cramps, drawing the flexors into visible knots. Stools watery, green, choleraic. After vomiting falls into an almost convulsive condition. Coldness and blueness of the surface, with cold sweat and great prostration.—*FERRUM PHOSPHORICUM*. Cholera infantum. Fever; heat of the head, with red face; full soft pulse.

Stools watery, even bloody, undigested. Painless. Vomiting of food soon after eating. Debility. Chronic diarrhœa.—**GUMMI GUTTI.** Stools thin, watery, yellow, fœcal. Or dark-green, offensive, with mucus. Stool expelled all at once, with a single prolonged effort, followed by relief. Gurgling in the abdomen as of a fluid running from a bottle.—**HELLEBORUS.** Stools of pure white, jelly-like mucus, frequent, often involuntary. Dark, scanty urine, with coffee-ground sediment. Skin cold and clammy; boring of the head in the pillow; automatic motion of one side of the body. In protracted and dangerous cases. Hydrencephaloid.—**IPECACUANHA.** Constant sickness at the stomach; vomiting. Stools grass-green, fermented; dark and fermented, frothy, looking like frothy molasses. Cholera infantum. Sleeps with eyes half open. Face pale.—**IODINE.** Chronic, exhausting diarrhœa. Stools watery, foamy, fatty, whey-like; or mucous, bloody, fetid. Worse in the morning and after drinking milk. Pale, yellow complexion. Will not allow anyone to come near him. Eats often and heartily, but continues to grow thin. Glandular enlargements.—**JALAPA.** Stools watery, sour; cutting colic; quiet all day, cries all night.—**JATROPHA.** Cholera infantum. Profuse watery stools, gushing out like a torrent. Unquenchable thirst. Vomiting of large quantities of watery, albuminous substances. Rumbling in the bowels, and noise as though a bottle of water were being emptied in the abdomen, not ceasing after stool. Cold, clammy perspiration.—**MERCURIUS SOL.** HAHN. Enterocolitis. Stools dark-green; frothy; like chopped eggs; watery, with greenish scum floating on the surface. Green, slimy stools, bloody. Undigested. Child seems to be ill at ease constantly, straining and fussing as though it could not get done. Appears to be in pain. Restless sleep. Sour-smelling night-sweat. Prolapsus recti. All the symptoms are intense.—**MAGNESIA CARBONICA.** "The bloody mucus is found mixed with the green watery stool, sinking to the bottom of the vessel and adhering there, but the watery stool remains alone" (Bell).—**PHOSPHORUS.** Chronic diarrhœa with "little grains like tallow" in the stool. Stools white, watery, gushing, of bloody water like the washings of beef. Liquid stool, green, bloody, oozing from the open anus. Involuntary, undigested stool. Painless diarrhœa. Thirst for cold drinks, with vomiting as soon

as they have turned warm in the stomach.—PHOSPHORIC ACID. Copious white or yellow watery stools, painless, and without loss of flesh or exhaustion.—PODOPHYLLUM. Very changeable diarrhœa, gushing, painless, worse in the morning. Watery, with meal-like sediment. Chalk-like; fœcal; frothy. Yellow mucous stool, offensive like carrion. Worse during hot weather, after eating milk, during dentition. Prolapsus ani.—PSORINUM. Stools dark-brown, thin, fetid; very offensive, almost worse than carrion. During dentition. Canine hunger. Great debility. Skin looks dirty, greasy, and the child smells foul even though well cared for.—RHEUM. Stool, sweat, and entire child smell *sour*. During dentition and hot weather.—RHUS TOXICODENDRON. Putrid, slimy diarrhœa, sometimes involuntary. Child restless, hot. Stools of jelly-like mucus, transparent, of bloody water, like the washings of beef. Involuntary at night when sleeping. Pale, sunken face; putrid smell from the mouth. Tongue dry and rough, with red tip and edges.—SECALE. Stools colorless, watery, slimy or dark-green, offensive. Gushing, involuntary. Intense thirst. Vomiting immediately after eating. Skin cold, blue, clammy, shrivelled; icy coldness of the extremities; in spite of being so cold, he cannot bear to be covered.—SULPHUR. Scrofulous diathesis. Valuable as an intercurrent. In chronic cases. "Stools generally thin, watery, sometimes mucous, white or green, sometimes with bloody streaks, sometimes undigested, generally very fetid; nearly always worse early in the morning in bed"—Allen. Excoriations about the anus and genitals. Offensive odor about the body in spite of frequent washing. Great prostration and rapid emaciation.—TABACUM. Cholera infantum. Stools yellowish, greenish, slimy. Tenesmus. Collapse. Icy coldness of the leg below the knee. Warmth of the body, with icy cold hands. Feeble, irregular pulse.—VERATRUM ALBUM. Cholera. Sudden attack of violent vomiting and purging. *Intense colic*. Stools are profuse and watery, bilious, green. Rumbling in the bowels. Cold sweat on the forehead. Violent thirst. Vomiting worse from drinking, with violent retraction of the abdomen when vomiting. Voice husky and feeble. Breath cold. Great weakness. Suppression of urine. Skin of fingers and hands wrinkled and cold. Skin cold and blue. Collapse.

APPENDICITIS.

Appendicitis or inflammation of the vermiform appendix is an affection which until recently was not recognized, but now ranks as a rather frequent and clinically very important disease of the intestine. The term is intended to cover pathological conditions formerly described under the names typhlitis, perityphlitis and extra-peritoneal abscess of the right ileac fossa.

It is a disease chiefly of youth, by far the larger number of cases—about 60 per cent.—occurring between the sixteenth and thirtieth year of age. According to American statistics the number of men who have appendicitis is greater than that of women; European statistics rather show the reverse. Occupation is an ætiological factor in so far as persons who are obliged to lift heavy weights or whose employment involves exposure to blows on the abdomen or to similar injuries (trauma), are quite liable to it. The most important cause undoubtedly is the entrance into the appendix, and the retention there, of fæcal matter which eventually forms concretions of stony hardness (enteroliths, coproliths), setting up inflammation; these fæcal concretions in shape and hardness resemble date-stones. Local irritation from other causes, notably the ingestion of indigestible, irritating food (as peanuts) or foreign bodies (as pieces of bone, seeds of grapes or raisins, or pits of cherries), is responsible for many cases. Ulcerative processes connected with typhoid fever or tuberculosis may attack the appendix, as other structures. In the relapsing form of appendicitis slight indiscretion in eating may prove sufficient to bring on a violent attack.

Morbid Anatomy.—Cases of appendicitis may be divided into two classes: those which stop short of ulceration and those which go on to ulceration with its usual and dangerous consequences.

In the lighter form of *catarrhal appendicitis* there is shedding of the epithelium and infiltration into the mucosa; when more severe, all the coats are thickened, the mucous membrane denuded and covered with granulation tissue. Circumscribed patches of peritoneal inflammation with adhesions may, or may not, exist. The thickening of all the coats of the appen-

dix, including the muscular coat, renders the tube firm and hard, like a finger or sausage. If pressure from without now brings into contact the opposing granulated surfaces, firm adhesions form and obliteration of the tube results, with immunity from further trouble (*obliterative* appendicitis). Excessive stiffness of the walls may, however, render them so unyielding as to effectively prevent the approximation of the granulated surfaces; if so, there is a chronic appendicitis with recurring exaggerations of all the symptoms. A stricture of the tube at the cæcal end is liable to result in dilatation above, constituting a cyst, which contains clear fluid or pus. Catarrhal or obliterative appendicitis may terminate in resolution or ulceration.

Ulceration of the appendix may be due to typhoid or tuberculous processes, to the presence of fæcal matter or other foreign bodies, or to the action of micro-organisms. Fæcal concretions or foreign bodies do not necessarily cause local inflammation; they have been found after death, with entire absence of local disturbance or only an atrophy of the mucous membrane upon which they were pressing. In other instances they undoubtedly excite inflammatory action leading to ulceration.

Perforation may, or may not, follow ulceration. Cicatrization may take place, greatly changing the shape of the appendix, even completely obliterating it. Or necrosis of tissue and sloughing may occur at the seat of the ulceration, preferably the tip, involving a more or less extensive portion of the appendix, followed by perforation. Or the entire appendix may slough off the cæcum, without perforation.

Efforts to determine the specific cause of *Acute infective appendicitis* have led to the conclusion that the presence of bacilli (bacillus coli communis, streptococcus pyogenes, strept. pyog. aureus, and others), especially of the streptococci, is intimately connected with the infection, but that an important additional factor is found in the feeble powers of resistance which the appendix, as a "degenerate and functionless organ" (Hawkins), offers to the bacterial invasion.

Adhesive inflammation constitutes a very important part of the ulcerative process going on, since in many cases it confines the abscess within narrow limitations (intra-peritoneal abscess). The situation of the intra-peritoneal abscess differs. It

is more commonly found on the psoas muscle, at the angle between the ileum and cæcum, or in the ileac region, between the navel and the anterior superior spine. It differs greatly in size, and contains yellow, thick pus, usually of fæcal odor, which in the old and limited abscess may be dark and indescribably offensive. The intra-peritoneal abscess does not give rise to immediate serious symptoms and, if small, may end in resolution.

Extra-peritoneal abscess usually terminates in the extensive formation of pus, with openings into the intestine, bladder or other parts, as the pleura; even here recovery may follow. A *retro*-peritoneal abscess, usually extending downward toward Poupart's ligament or upward toward the kidney, occurs in case the appendix is posteriorly situated.

Acute general peritonitis may result from rupture into the peritoneal cavity or from extension of the inflammatory process. It is always serious, but particularly so in cases of acute infective appendicitis characterized by the presence of the streptococcus pyogenes. Hæmorrhages from destruction of the coats of an artery (internal ileac, deep circumflex ileac) and inflammation of the mesenteric veins with suppurative phlebitis may arise in the course of the extensive suppuration.

Symptoms.—It has been asserted that in a young person, especially after indiscretion in diet or after the receipt of an injury in the abdomen, as from a blow or a fall, the appearance of sudden pain in the abdomen (particularly in the right ileac fossa), of moderate fever, tenderness in the region of the appendix, with nausea, vomiting and constipation, almost surely indicates appendicitis. This statement, made upon good authority, seems borne out by facts.

Pain is a common and early symptom. It is present in about 85 per cent. of all cases, and is sharp, cutting, like colic, or consists of a dull, heavy ache. Its favorite seat is the right ileac fossa, but it may occur at almost any other point in the abdomen, according to the location of the appendix. It often shoots downward into the perinæum or testicle and is aggravated by any movement of the body or from slight pressure, compelling the patient to bend forward and toward the right when walking or, if in bed, to lie with the right leg drawn up.

Fever with rise of temperature, appearing almost at once with the first sensation of pain, is highly characteristic, so much

so that the absence of fever with pain in the abdomen throws doubt upon a diagnosis of appendicitis. Exceptionally there may be an initial chill. Usually the elevation of temperature is moderate, not often exceeding 102° ; in children it may reach 103.5° . The pulse is accelerated in proportion to the fever. Breathing is superficial when the abdominal pain and tenderness are great.

Nausea and *vomiting* may be absent, and when present they appear on the second day if the case promises to terminate favorably; in the severe infectious form, vomiting, often with hiccoughing, is common. Thirst usually is intense; the tongue is moist and furred, rarely dry. Constipation is the rule, but there may be diarrhœa, especially in children.

Palpation develops great tension in the right rectus muscle and tenderness and severe pain in the right ileac fossa (McBurney's point: about two inches from the anterior superior spine of the ileum in a line drawn from it to the navel). A little later, a diffuse or clearly defined swelling may be found in the right ileac fossa, some two inches, usually, above Poupart's ligament. If the tumor is small, or when it lies underneath a coil of intestines, it is beyond reach of detection, save as it may be found by the finger introduced into the rectum.

The urine is scanty and albuminous, and there may be considerable irritability of the bladder; the position of the patient is usually on the back or right side, with the right leg drawn up toward the abdomen.

Course.—Mild cases are likely to recover in a few days, perhaps in a week or ten days, with gradual lessening of the pain and tenderness to touch and pressure. The occurrence of a natural stool is highly indicative of an early and favorable termination. Other cases run a somewhat more tedious course, with more or less fever, recovering in a few weeks. The recovery, however, may not be complete. A chronic inflammation of the appendix may remain; or there may have been sufficient involvement of the peritonæum to cause circumscribed adhesion; or a tumor may be left, probably indicative of pus-formation. In either case there are likely to be recurrences of the disease. Talamon describes an "appendicular colic," due to the partial occlusion of the appendicular lumen, resulting in paroxysms of violent and irregular peristalsis of circular and longitudinal muscles with the expulsion of mucus.

If there is at the end of the first week no improvement in the totality of the constitutional symptoms or in the local affection, or if these should be worse, the formation of an abscess may be expected. To warrant this, there need not be of necessity an increase of fever, although such is frequently the case; neither is pus-formation always delayed for this length of time; as a matter of fact, as early as the fourth or fifth day an examination may reveal an induration sufficiently large to prove the forming of pus.

Abscesses vary as to size and situation. Those located in the pelvic cavity are of particular interest. They may empty through the rectum, vagina or bladder, or through some external opening, with the possibility of recovery if well-drained. The danger of septicæmia is apparent. Death occurs from septicæmia, hæmorrhage, or pylephlebitis.

Perforation into the peritoneal cavity is nearly always followed by fatal diffuse peritonitis. It constitutes the most startling complication which may arise at any time after pus has formed, even as early as the second or third day. The symptoms are: intense pain in the abdomen, excessive abdominal tenderness, great distension, severe and frequent vomiting, hiccoughing, frequent, small, thready, soft pulse, coldness and blueness of the surface with, often, a high internal temperature, superficial breathing, Hippocratic countenance.

A general peritonitis may result from extension of the inflammatory process; in fact, this may be the case at the very beginning. It is recognized with difficulty. A most careful watch upon the general symptoms is absolutely necessary, since they, rather than the local condition, indicate the presence of this form of peritonitis. It must be remembered that the fever, even in such cases, may be moderate after the first three or four days, the thermometer registering only from 100° to 100.5° F.

Relapses, it is estimated, occur in twenty-four to forty-five per cent. of all the cases. They appear at varying intervals, perhaps every few months, then to disappear entirely, or with such frequency—brought on, perhaps, by the slightest indiscretion in diet—as to render the patient a chronic invalid. The pathological condition in such cases is that of an obliterated inflammation, or of adhesion, or of a small localized circumscribed abscess held within a capsule of dense fibrous tissue. If

the chronicity of the case has been well established, an operation constitutes the most satisfactory treatment.

Diagnosis.—The diagnosis depends upon the sudden appearance of severe localized pain in the right ileac fossa, with fever, with or without induration, tenderness to touch and pressure at McBurney's point, with constipation, occasionally diarrhœa, and mild gastric disturbances, all these occurring preferably in young subjects.

It is differentiated from *strangulation* and *intussusception* by the presence of fœcal vomiting in the former, coupled with the fact that the seat of pain, with rare exceptions, is not in the region of the cæcum; intussusception has bloody stools and tenesmus.

Since public attention has been so persistently drawn to appendicitis as a disease of great frequency, many cases of imaginary appendix disease occur, and a physician must be the more careful in making the diagnosis. Thoroughness in observing and properly estimating the value of symptoms will usually prevent serious mistakes. That these are not always exercised is proved by the fact that in many instances operations have been undertaken when the appendix was found perfectly normal.

Among other affections which simulate appendicitis, but which can be differentiated, may be mentioned: pelvic peritonitis and disease of the tubes, acute hæmorrhagic pancreatitis, typhoid fever, mucous colitis with enteralgia, perinephritic and pericæcal abscess, circumscribed peritonitis in the region of the cæcum, and even hysteria.

Prognosis.—Recovery is the rule. Statistics gathered by Hawkins, of London (1895), show that 264 cases treated at St. Thomas's Hospital, representing all forms of the disease, gave a mortality of fourteen per cent. Tables compiled by other observers make a similar showing. In private practice the results have been even much more satisfactory.

Treatment.—Osler, who practically relegates to the surgeon all cases of appendicitis, truthfully remarks that it is the element of *uncertainty* in individual cases which has sanctioned almost exclusively surgical methods in the treatment of this affection. Nevertheless, appendicitis belongs to the domain of the physician, and should be transferred to the surgeon only in

exceptional cases. Lives, it is true, have been sacrificed by stubborn unwillingness on part of the patient to submit to an operation when such a procedure was pointedly indicated, and also by neglect on part of the physician to place cases into the hands of the surgeon while yet there was a chance to obtain relief from an operation. Still, "meddlesome" surgery has been very busy with this class of sufferers and is responsible for a vast amount of mischief done. There is abundant evidence of a rebound from the overwhelmingly surgical treatment which has been the fashion, and which at no time was based upon sound reasoning.

Surgical interference is justified and necessary to afford exit to pus already formed; in cases of perforation and for the treatment of its consequences; in chronic relapsing cases which have resisted other methods of treatment and are threatening to destroy or seriously impair the comfort and usefulness of the patient.

The use of opium for the relief of the severe pain of appendicitis is mischievous and inexcusable. So much depends upon the early recognition of symptoms indicative of the approach of dangerous complications that a knowledge of the character and degree of pain is an absolute necessity. Whatever under these circumstances blunts the consciousness of the patient must be avoided and constitutes reprehensible practice.

Rest in bed from the very moment the first symptom declares itself is an absolute necessity. The stomach, also, should be allowed rest, and such food as the patient absolutely requires should be bland and concentrated, not to burden the intestine with a large accumulation of fæcal matter. The existence of constipation may demand the very cautious use of an enema, but even this comparatively harmless measure had better be dispensed with in all save exceptionally stubborn cases, so as to give the bowel also perfect rest. Laxatives should never be employed. Local applications to the abdomen are of questionable value; but no strenuous objections exist to the application of heat over the seat of the pain.

Therapeutics.—The remedies most likely to prove useful are those which exercise a controlling influence over the inflammatory process and thus may prevent the formation of pus; pus once formed, the exhibition of HEPAR SULPH., SILICA and others

of that class, though theoretically sound, is of slight practical value.

BELLADONNA in the early stage covers the totality of symptoms better than any other remedy, and may even prove useful later on. It has pain in the abdomen, characterized by excessive sensitiveness to touch, even the trifling weight of the bed-covering being unbearable, and many of the minor symptoms.—MERCURY will probably follow BELLADONNA if after twenty-four or thirty-six hours the condition of the patient has not improved. The indications, by Raue, are: "painful, hard, hot and red swelling in the ileo-cæcal region, painful to the touch; face red, pale and sickly; tongue red and dry or white and flabby; alternation of chilliness and heat; constipation or frequent slimy discharges with straining; sweat without relief." If the symptoms calling for MERCURY are characterized by great intensity, MERCURIUS CORROSIVUS should be preferred to the milder preparation. These two remedies in general adaptability to appendicitis stand preëminent.—ARSENICUM ALBUM, though successfully prescribed for an almost infinite variety of morbid states, has rarely been used here. A study of its pathogenesis suggests its probable value, and I have seen prompt action from it in recent cases in which its well-known characteristics were present.—BRYONIA is suggested by symptoms of peritonitis, as is VERATRUM VIRIDE.—DIOSCOREA has been recommended when the patient is never free from pain, but has decided paroxysms of aggravation; the pain is accompanied by "stretching."

The rapid course of the disease requires prompt action, and the more delicate symptoms are so generally overshadowed by those which are strictly peculiar to the local affection that differentiation resting upon minute shading is difficult. Hence, while theoretically almost anyone of many remedies may be indicated (as: GELSEMIUM, ACONITE, RHUS TOXICODENDRON, PLUMBUM, PHOSPHORUS, CROTALUS, BAPTISIA, LACHESIS, NITRIC ACID, OPIUM and others) in actual practice BELLADONNA and MERCURY outweigh them all.

Special conditions must be met by remedies homœopathic to them. Here belongs the exhibition of SILICA, ARSENIC, HEPAR SUPH. and SULPHUR in fistula; of PHOSPHORUS, SILICA, SULPHUR or AURUM when there is necrosis of bone; BRYONIA, BAPTISIA,

RHUS, LACHESIS, ARSENIC, and others, when there is a typhoid state.

PHLEGMONOUS ENTERITIS.

A diffuse purulent infiltration of the intestinal walls, with tendency to the formation of an abscess in the deep tissues. It is usually a secondary process in connection with strangulated hernia, intussusception and chronic obstruction. The symptoms are those of peritonitis or, if the affection is limited to the rectum, of peri-proctitis.

PSEUDO-MEMBRANOUS ENTERITIS.

Pseudo-membranous enteritis (diphtheritic, or croupous, or membranous enteritis) is seen in connection with certain infectious diseases (as pneumonia, pyæmia, typhoid fever, tuberculosis), toward the termination of various chronic affections (as nephritis, cancer, cirrhosis of the liver), occasionally in the entero-colitis of children, and in poisoning with lead, arsenic and mercury.

The characteristic lesions vary. In some cases a thin, grayish-yellow exudate, resting on a deeply congested base, occupies the top of the folds of the mucosa, involving the mucous layer superficially or deeply, as the case may be. The colon and ileum are the favorite seat of this form. Or small patches of a grayish-white pseudo-membrane are found, chiefly in the cæcum and colon. Or there is inflammation and enlargement of the solitary glands, capped with diphtheritic necrosis, with a tendency to the formation of ulcers.

The symptoms are not easily recognized and may wholly escape observation. Pain and diarrhœa may be present; rarely diarrhœa of mucus and blood, with tenesmus.

MUCOUS COLITIS.

Mucous colitis (membranous enteritis, mucous colic, tubular diarrhœa) is a non-febrile disease of the large intestine, characterized by the periodical discharge of tenacious, adherent mucus

(mucin) in the form of glairy, tenacious stool, in irregular masses, or as strands or tubular casts of the bowel.

The *cause* of the disease is not known. It is not of frequent occurrence, but when seen, it is in connection with some functional affection of the nervous system. Statistics show that about 80 per cent. of the cases occur in young women of a nervous, hysterical disposition, often the subjects of uterine or ovarian irritation or of some menstrual disorder; in rare instances young children suffer from it; exceptionally it has been observed in men, nearly always neurasthenics.

Symptoms —The symptoms are those of recurring attacks of abdominal pain (enteralgia) and tenderness, with diarrhoea and the passage, with some of the stools, of mucus in masses of tenacious, dense slime, or firm, opaque membranous matter twisted into the semblance of a rope or retaining the shape of the intestine, forming a tubular cast of varying length. The expulsion of this substance affords relief from the pain. These paroxysms recur at intervals of a few weeks to several months, although in some cases the affection appears continuous. During the interval the patient may give some evidence of intestinal irritation and will exhibit the symptoms of the associated nervous affection.

The attacks frequently are painful and exhausting; blood is occasionally seen in the stools; the nervous system may be in a state of great excitement or exhaustion. Any unusual strain, fatigue or effort may bring on such an attack.

The duration of an attack is from a few days to two weeks; of the affection, it is indefinite. It has proved intractable, and while not directly involving life, is exhausting and discouraging to an unusual degree.

The treatment consists, first, of measures calculated to remove any existing nervous affection or such uterine or other disorder of the reproductive system as may cause or aggravate the nervous disease; secondly, to restore the integrity of the mucous membrane of the colon; thirdly, to ward off the individual attack. The habits of life, as to employment and mode of living, must be regulated; the diet must be nutritious and non-irritating; the patient must be kept out of doors as much as possible; irregular hours, trashy reading, and whatever may stimulate the neurotic proclivities, must be avoided. If within

reach, a change of residence or a season of travel should be advised. Especial pains must be taken to keep the bowels in good order, avoiding both constipation and diarrhœa.

With particular reference to the abdominal affection consult: AGARICUS, ALOE, ASARUM, BELLADONNA, BORAX, CACTUS, CAPSICUM, CHINA, COLCHICUM, COLOCYNTHIS, FERRUM, GRAPHITES, HELLEBORUS, HYDRASTIS, LACHESIS, NITRIC ACID, NUX VOMICA, PHOSPHORUS, PULSATILLA, RHUS TOXICODENDRON, SEPIA.

Hale reports a cure by ASARUM EUROP., five drops of the tincture four times a day. Another by EUONYMIN, one half grain three times a day; he highly recommends HYDRASTIS and its alkaloids, and speaks favorably of MURIATE OF AMMONIA.

Pepper urges the use of enemata of a quart of water with fifteen to twenty-five drops of nitric acid, the latter to be gradually increased to fifty drops.

INTESTINAL OBSTRUCTION.

Intestinal obstruction (ileus, obstipation, entero-stenosis) is a condition in which the passage of fœcal matter through the intestine is blocked by some mechanical obstacle. It may be partial or complete and acute or chronic.

Ætiology.—*Strangulation* is the most frequent cause. It occurs in about 35 per cent. of all the cases; 90 per cent. in the small intestine; 67 per cent. in the right ileac fossa; 70 per cent. in males; 40 per cent. of all cases observed are between fifteen and forty years of age. Loops of intestine may be caught and constricted in any of the pouches and diverticula found in the abdominal cavity, as in case of a duodeno-jejunal hernia, in which a loop is held in the duodeno-jejunal fossa; or of a diaphragmatic hernia, the abdominal viscera protruding into the diaphragm through some congenital defect in the diaphragm or through some injury to that structure. A tear or slit in the omentum or mesentery may catch and strangulate a coil of intestine. Or a loop of the gut may be firmly held in a position favoring strangulation by some membrane or false ligament, the result of a peritonitis, adhering to some part of the abdominal wall.

Intussusception or *Invagination* is the cause in twenty-five to forty-five per cent of all cases, and is most frequent in children under ten years of age. The process consists of the slipping of one portion of the intestine into another, as the end of the finger of a glove may slip into the lower portion of the finger. Thus three layers are formed: an external or receiving layer, a middle or returning layer, and an internal or entering layer. The invagination forms a descending cylindrical tumor, varying in length from a few inches to a foot, or more. It is thought to result from sudden and severe peristalsis of a limited portion of the intestine, possibly associated with paralysis of an adjacent part. The invagination is oftenest ileo-cæcal, the ileo-cæcal valve descending into the colon (in exceptional cases the valve may be felt at the anus). Other forms are: the ileal, involving the ileum alone; the colic, involving the large intestine; the colico-rectal, involving the colon and rectum.

It is probable that the presence of growths, like internal polypi, indirectly favors the production of invagination, the weight of the growth tending to drag upon that portion of the gut to which it is attached. Inflammatory adhesions are common. Gangrene may occur, with sloughing and ejection of the sloughed portion through the intestine. Cases are on record in which spontaneous healing of the parts followed this process.

Volvulus (twists and knots) occurs in three to ten per cent. of all cases. It is rare in children, but common in males in the fourth decade of life (68 per cent. of all cases). Usually, there is a long mesentery, allowing a twisting of the gut in its axis. Sometimes a regular knot is formed by other portions of the intestine winding themselves about the pedicle of the "twist." The weight of the twisted intestine and its contents, with the pressure made upon it by the overlying coils, renders spontaneous correction practically impossible. The accident in about one-half of all the cases occurs in the sigmoid flexure; next in frequency, in the cæcum.

Strictures.—These in rare cases are congenital. When so, their commonest form is seen in the rectum (atresia ani); if elsewhere, they are the result of fœtal peritonitis, at the sigmoid flexure, in the lower part of the ileum, at the ileo-cæcal opening. These are incompatible with long duration of life. If

acquired, they are due to cicatrization from syphilitic, dysenteric or tubercular ulceration. They hardly ever result from typhoid ulceration.

Tumors.—These usually are cancerous; should sloughing occur, the discharge of the slough affords relief. Benign growths in the intestine (papillomata, adenomata, etc.) produce the same effect. Tumors in adjacent parts (as uterine tumors or ovarian cysts) may compress and obstruct a portion of the intestine. The same effect may be caused by exudates from tubercular peritonitis; or compression may result, especially at the sigmoid flexure, from a coil filled with fæcal matter encroaching upon an adjacent coil.

Abnormal contents of the intestine (obstruction) largely refers to the presence in the intestinal canal of accumulations of fæcal matter firmly impacted (coprostasis) and at times attaining a remarkable size. Their growth is gradual, and for a long time nature endeavors to overcome the obstruction by channelling a passage through the solid mass; eventually these efforts prove in vain and the obstruction becomes complete. Obstruction may occur at any time of life. It is seen as the result of obstinate constipation in small children, in old people, and especially in women, when the rectum is absolutely blocked by a solid mass of hard fæcal matter which can only be removed by painfully digging it away with the fingers. Obstruction by *gall-stones* occurs usually late in life, oftenest in the ileo-cæcal region and in the duodenum. *Enteroliths* are formed by the deposit of phosphates of lime and magnesia around some foreign body, as a mass of hair or some tough fibrous substance. They are infrequent. Of late it is thought that persons who live upon a diet largely composed of oat-meal suffer from enteroliths, their center or core consisting of portions of oats (avenoliths). Foreign bodies in the intestine, as coins, stones of fruit, and other substances occasionally swallowed, usually pass through the alimentary canal and rarely give rise to obstruction.

Functional obstruction (idiopathic ileus) is a term applied to a rare form of obstruction which depends upon paralysis of some portion of the intestine, rendering it unable to perform the peristaltic function. It is associated with disease of the brain and cord and with hysteria; it may be caused by a blow upon the abdomen or, in rare cases, follow peritonitis.

Symptoms.—The symptoms of *acute* obstruction are pain, vomiting, constipation. While at times there are premonitory symptoms, such as uneasiness in the bowels and constipation, the onset usually is sudden and violent. A sharp pain in the bowels abruptly appears as the patient is walking about or is busy at some task; this at first is colicky; it rapidly increases in intensity until it is almost unbearable. Soon it becomes diffused over a considerable area, but is always particularly severe at the spot where it was first felt. Vomiting follows very soon, and is constant and distressing; it is first gastric, then becomes bilious, then stercoraceous, of brownish-black color and pronounced fæcal odor. The ejected substance does not consist of fæcal matter proper, ejected by reverse peristaltic action, but of the rotten, decomposed contents of the intestinal pouch formed above the seat of the obstruction. In cases approaching a fatal termination the vomiting may suddenly cease, being replaced by constant and distressing hiccough. Constipation is absolute after the bowel below the seat of obstruction has become emptied; there is even cessation of the emission of flatus. Rapid distension of the abdomen, chiefly *above* the seat of obstruction, takes place; hence the distension is comparatively slight when the obstruction is in the smaller bowel, and immense when in the large intestine. Efforts on part of the intestine to overcome the obstacle result in violent peristalsis above the seat of obstruction, with rumbling of gases and borborygmi which are easily heard in the room. Tenderness throughout the abdomen soon develops, and after a little becomes excessive.

The constitutional symptoms are severe from the beginning, and grow worse rapidly. There is much restlessness and anxiety from the start; the features assume quickly a drawn, haggard, anxious expression; the eyes are sunken; the face pinched; the tip of the nose cold; the surface of the body bathed in cold, clammy sweat. The tongue is dry and parched; the voice husky, the pulse rapid and thready, and respiration shallow; urine is scanty, high-colored and even suppressed. The temperature at first may be moderately elevated, later it becomes normal, then subnormal. These symptoms, indicative of collapse, deepen, and death from shock, sometimes preceded by coma, occurs in from two to six days.

Chronic obstruction is almost always the result of gradually increasing fæcal accumulation at some point, and is preceded by symptoms indicating intestinal *constriction*. There is a tendency to constipation, the bowels moving at irregular and long intervals, with much effort and considerable pain. The stools may attract attention by their peculiar shape, which, however, is not seen in this condition only. In some cases the stool is long, slender, ribbon-shaped; in others, furrowed on one side; again, it appears in small, round balls, like the excrement of sheep. If the seat of constriction is in the small intestine, the contents of which are semi-fluid, constipation may not exist and the passages may even be diarrhœic. Distension of the abdomen is common, but comparatively moderate when the constriction is in the small bowel. Peristaltic efforts are pronounced. They are plainly visible, and often the outlines of the involved intestine may be distinctly and easily traced or felt, thus aiding greatly in fixing the seat of the trouble.

Unless relieved, the condition gradually, in the course of weeks, months or even years, develops until we suddenly deal with an unmistakable case of obstruction. It may be assumed that the constipation has become more and more troublesome, although the obstructing mass has been channelled and there has been an escape of semi-fluid stool from the small intestine; sometimes even a mucous diarrhœa has been noted. Suddenly, however, vomiting sets in, with severe abdominal pain and other threatening symptoms, or an intense colitis or peritonitis may result from the presence of the hard, immovable mass of fæcal matter, undoubtedly favored by the rapid growth of germs which thrive in the abdominal contents of the intestine above the stricture. In some cases absolute retention of fæces may exist for a long time, even weeks, without causing serious disturbance. In the development of this condition the walls of the intestine at the seat of a severe stricture may become thinned, and are thus easily perforated; or diphtheritic inflammation may set in, with a tendency to ulceration. The wall above the seat of the stricture usually assumes a condition of hypertrophy from the prolonged effort of the muscular structure to overcome the obstacle. Below the constriction the gut is empty and contracted.

The constitutional symptoms of chronic obstruction are

those of general progressive impairment of health, emaciation, loss of strength, anæmia and, upon the culmination of the obstruction, death with symptoms as described.

Diagnosis.—The diagnosis deals not only with a differentiation of this affection from other and similar diseases, but aims to determine the location of the obstruction and its character.

In attempting to determine the location and character of an obstruction, examination should be made by the rectum and vagina, with palpation and inspection of the abdomen. Examination *per rectum* reveals invagination of the bowels and the presence of a fæcal mass in the rectum. *Vaginal examination* demonstrates the presence of such lesions of the pelvic organs as by encroaching upon the intestine may have produced the obstruction (as uterine and ovarian tumors, etc.). Not infrequently the collapsed, flaccid gut below the seat of the obstruction falls into the pelvis and may there be recognized. *Palpation* will fix the seat of special tenderness, or detect a tumor or an old strangulated hernia. *Inspection* will show the spasmodically contracting or distended coil of intestine above the seat of stricture. Thus much may be learned. Wyllie points out that in obstruction of the lower portion of the large bowel the colon may stand out plainly in horse-shoe pattern, while in obstruction of the cæcum or lower end of the ileum the so-called ladder-pattern is produced by violent visible peristalsis of the small intestine. The shape of the abdomen also is of diagnostic value.

The following aid in locating the point of obstruction. If the *duodenum* or *jejunum*: abdominal distension is slight, vomiting and collapse occur early, and there probably is suppression of urine. If the *ileum* and *cæcum*: the distension is most pronounced in the umbilical region; this, being rounded and raised, gives to the flanks a flattened appearance. The course is rapid, with early fæcal vomiting. If the *colon* or *rectum*: general and uniform distension of the abdomen. The symptoms are less intense; the urine is less scanty than when the obstruction is in the upper bowel, and there may be tenesmus.—Distension of the lower bowel by the injection of water has been practiced for diagnostic purposes, but is not conclusive. If the bowel holds less than four quarts of water, an obstruction in the upper portion of the large intestine may be suspected. The injec-

tion must be made with care and under low pressure, with a fountain syringe moderately elevated, not over six feet high in children nor more than fifteen feet in adults. The patient should be anæsthetized and placed in the dorsal position, with the hips raised.

Strangulation occurs suddenly, usually after an exertion, and is accompanied with excessive pain and early vomiting, which is copious and soon becomes stercoraceous. There is early and great prostration; late distension and tenderness; constipation is absolute. Tumor can be detected in only exceptional cases. Rectal examination reveals nothing. History of injury to the abdomen or of preceding peritonitis. *Intussusception*, almost always in children. Onset sudden. Prostration early and profound. Vomiting early, but rarely fecal. Little, if any, abdominal distension. The abdomen may be flat. In fifty per cent. of all the cases the tumor may be detected per rectum. Tumor in right ileac fossa, seen early. Tenderness about the tumor. Tenesmus and passing of blood-stained mucus, early, in about fifty-five per cent. of all the cases. *Fæcal obstruction*: course one of gradual development. History of chronic constipation, with sudden onset of symptoms of acute obstruction. Mass can often be felt. Pain; nausea and vomiting late. In very exceptional cases diarrhœic discharges from the catarrhal irritation of the intestinal mucous membrane. *Obstruction by foreign bodies*: almost always has a history of some foreign substance having been swallowed, with pain and discomfort arising from it, culminating in acute symptoms of obstruction when lodged. There will then be increasing pain, with rapidly developing abdominal distension and tenderness, vomiting not setting in until late. If due to an impaction of *gall-stones*, the history of the case (gall-stone colic) will aid the diagnosis. When impacted in the duodenum, the symptoms are violent from the beginning, with persistent bilious vomiting, suppression of urine and rapid progression of the case to collapse.

The symptoms are so well-marked that a differentiation from other affections is not often difficult, with the exception of *acute hæmorrhagic pancreatitis* and *acute enteritis*. The former may easily be mistaken for obstruction, and expert diagnosticians have failed to distinguish between the two. When

the onset of acute enteritis is sudden, the vomiting intense, and distension of the abdomen and tenderness occur rapidly, the resemblance to obstruction is striking, but the character of the vomitus and the physical signs will establish the diagnosis. *Appendicitis* has a more continuously elevated temperature and there may be a history of previous attacks of the same character.

Course and Termination.—Acute obstruction usually terminates fatally in from two to six days. Chronic cases may continue for an indefinite length of time, with the constant danger of acute symptoms setting in at any time. The prognosis is rather unfavorable in all cases, least so from obstruction which results from the impaction of fæcal matter; in these relief is sometimes had by the sudden expulsion of the offending substance. But even in other cases recovery may take place under seemingly hopeless conditions, such as occurs when a large strangulated mass has sloughed off and is passed through the intestine.

Treatment—It is evident that throughout pains must be taken to maintain the strength of the patient in every way possible. Easily assimilated food of a character that yields very little residue must be given at stated hours; stimulants, as iced champagne or whisky, may be administered, and pieces of ice sucked to relieve thirst and vomiting.

Mild laxatives, as castor oil, may be cautiously used, but purgatives are dangerous and not to be considered. The application of cloths wrung out of hot water is grateful to the patient and may prove useful. Kuessmaul, Cohn, and others, recommend lavage of the stomach, claiming that it not only relieves the vomiting, but often, by removal of decomposing matter, lessens the distension and pressure, and thus proves of great service; it stimulates peristalsis. Irrigation of the large bowel with a siphon syringe has warm advocates. Jonathan Hutchinson advises that the patient be anæsthetized, the abdomen thoroughly kneaded, and a copious enema given while in the inverted position. "Then, with the aid of three or four strong men, the patient is to be thoroughly shaken, first with the abdomen held downward, and subsequently in the inverted position."

Inflation by forcing air into the rectum has been practiced.

The operation is done with a bellows or proper syringe, but care must be exercised not to rupture the bowel. Fitz states that out of forty-four cases treated by irrigation and inflation thirty-three recovered and eleven died.

Tympanitis requires hot applications to the abdomen or the turpentine stupe. If excessive, relief may be afforded by puncturing the bowel with a fine aspirator needle; there is, however, some danger of the escape of fæcal matter, followed by peritonitis.

If improvement does not occur on the third day, surgical interference, including laparotomy, becomes advisable, even imperative. The safety, now, of operations which until a few years ago were full of risk vastly increases the responsibility of the physician in these cases.

The management of the chronic form, or of constriction, is centered upon intelligent medication and regulation of the patient's diet, insuring generous nutrition and the smallest possible residue.

Reference has been made to the removal of impacted masses of fæces from the rectum; it is accomplished by the use of some blunt instrument, as a spoon, or by the fingers, aided by repeated injections of warm water with soap, olive oil, or some other softening substance (see "Constipation"). An infusion of tobacco, thrown into the rectum, is a favorite remedy with the common people in Europe when the services of a physician cannot be had, and is known to have rendered very good service.

Therapeutics.—It seems scarcely rational to exhibit a remedy for the purpose of meeting dangerous symptoms which depend wholly upon the presence of mechanical causes; but there is nothing irrational in exhibiting remedies which may aid in keeping these symptoms under control while other efforts are made to remove the mechanical cause. The very gravity of the case warrants our doing all that can be done for the patient, and there certainly is less probability of our doing harm by the exhibition of a well-chosen simple remedy than by the use of purgatives, heavy doses of opium, or the once so fashionable, and even now frequently advocated, employment of heavy masses of metallic quicksilver. Common sense, however, suggests that the exhibition of a remedy is

only one of many things to be done and that it would be criminal folly to depend upon it alone.

The remedies most likely to be of service are: BELLADONNA, COLOCYNTHIS, NUX VOMICA, OPIUM, PLUMBUM, VERATRUM ALBUM, ARSENIC, CUPRUM.

CONSTIPATION.

Constipation, retention of stool, or difficult or tardy expulsion of stool, is often the result of an *inherited tendency* which is strongly pronounced in some families; it is more frequent in women than in men and in brunettes than in persons of light complexion. *Diet* is frequently at fault, food being habitually used which affords too little or too much residue. *Sedentary habits*, especially when coupled with a hearty appetite and an occupation which closely absorbs the attention of the patient and thus leads to neglect of the calls of nature, almost surely leads to stubborn constipation. Often it is the result of *atony*, of a loss of energy in the peristaltic movements of the intestine, which may be due to general weakness of the body or to some affection of the intestine itself. *Acute and chronic enteritis* are commonly accompanied by constipation; a *jaundiced* state produces the same result, presumably from that absence of excitation in the intestine which the presence of bile is thought to cause. Affections of the *brain and cord* may interfere with normal inhibition, thus deranging the delicate machinery upon the perfect working of which the act of digestion and the onward propulsion of stool depends; many of the psychoses, as hypochondriasis, are almost invariably associated with constipation. In certain *acute fevers* this state is common. One of its most fruitful causes is the habit of constant drug-taking, especially the habitual use of cathartics.

Among other causes may be mentioned: *Weakness of the abdominal muscles* from obesity or, in women, from the strain put upon them by many pregnancies. Intestinal *strictures* or *tumors* (large scybala), or *atony* and dilatation of the colon, especially at the sigmoid flexure, with dilatation of the sacculi. *Contracted state* of the *bowel*, resulting from dysentery or ul-

cerative colitis or in hysterical women who suffer from uterine disease. Gastric disorders also cause constipation, probably from reflex action.

The constipation of infants usually depends upon general muscular atony, torpor of the liver and intestinal glands, improper feeding (including poor quality of breast-milk and the excessive use of starchy foods), and too ready recourse to castor oil, fig-syrup, and other popular laxatives. Constipation of the *aged* arises from inability to properly masticate food, absence of regular and needed physical exercise, and general atony.

Symptoms.—Constipation, especially when habitual, may persist indefinitely without giving rise to serious consequences or even inconvenience. In the majority of cases unusual torpidity of the bowels tends to heavy, dull headache, loss of appetite, furred tongue, bad taste in the mouth, lassitude, and sense of slight malaise. Mental uneasiness and despondency result more often from the very common, and in the main correct, belief that daily evacuations are necessary to the maintenance of health, and from worry, especially in nervous people, because of temporary failure to accomplish the desired end.

Indirectly, a large and varied list of troubles is the legitimate outcome of constipation of long standing. Thus in women the presence of hard masses of fæcal matter in the bowel tends to greatly aggravate menstrual pain and may become a cause of uterine disease; neuralgia of the sacral nerves often arises from pressure of stool in the sigmoid flexure; hæmorrhoids and ulceration, especially in the colon, and enteritis are legitimate results of long-continued retention of stool. Even more serious consequences may result, such as intestinal obstruction. Accumulations of hardened fæcal matter may frequently be felt in the colon, especially at the hepatic and splenic flexure, forming an irregular lumpy tumor or sausage-like masses.

Treatment.—It is of first importance to determine, if possible, the primary cause and to regulate the life and daily habits of the patient. A reasonable amount of exercise, especially on part of those whose habits are sedentary, is in itself capable of accomplishing much good. It is equally necessary to insist upon prompt compliance with the calls of nature. Wrong notions of propriety must not be allowed to stand in the way.

When the habit has become confirmed, the patient must be made to visit the bath-room or closet at a stated hour, preferably soon after breakfast, there to remain long enough to allow an evacuation to take place, but without doing unnecessary "straining," which does more harm than good. Even though no immediate results may be obtained, in the majority of cases the bowels will after a time begin to move, and regularity may thus be insured. Women and children are much given to not allow nature sufficient time when they visit the closet, and this pernicious habit of "hurrying" must be broken. I know of a mother who had become wise through personal suffering, who did not permit her children to leave the seat of the closet in less than fifteen minutes in the morning, and who thus effectively overcame the natural tendency to constipation which had been inherited.

Much assistance can be had from the regular observance of certain rules which universal experience has proved to be beneficial, such as taking a glass of cold water upon rising, before breakfast, or a drink of hot water before retiring.

A proper diet is indispensable to a cure. Persons who eat too much meat, egg or fish must be made to add vegetables, coarse brown breads and fruits to their dietary; the reverse must be urged in appropriate cases. Often it is necessary to insist upon the necessity of taking liquids more freely, for some persons drink too little. It is exceedingly difficult to point out just what changes must be made, for the necessities or preferences of any two people are rarely the same; but in a general way it is safe to demand the use of a judiciously mixed diet, with brown bread (corn, whole wheat, rye) in preference to white bread; oat-meal mush for breakfast; fresh vegetables (salads, spinach, onions, especially boiled) and a generous amount of pure water or of aerated mineral water.

When these are not sufficient, *massage* will often be found very helpful. For home-treatment, a metal ball, weighing from four to six pounds, rolled each morning to and fro upon the abdomen for ten or fifteen minutes, answers the purpose; the manipulations of an experienced operator are, of course, preferable. *Electricity* is of undoubted value in very many cases. Rockwell (International System of Electro-Therapeutics) says: "In a certain proportion of these cases electricity is of positive

value, accomplishing more perhaps than most other methods of treatment. Both the galvanic and faradic currents may be used, but my preference has been and is for the faradic. Its powerful mechanical and limited reflex effects seem to be better adapted to restore the impaired irritability of the muscular coats. In the intestinal paralysis due to distension from retained fæces and from the action of powerful cathartics, the best results are obtained from internal applications, sometimes by the unipolar, sometimes by the bipolar, method. In the unipolar method, one pole, preferably the anode, is introduced into the rectum, while the other is applied externally to every part of the abdomen as well as to the dorsal and lumbar regions of the back. If the galvanic current is employed, the cathode should invariably be placed internally, the extent of the introduction depending upon the necessities of each individual case. The strength of the galvanic current should hardly exceed two or three milliamperes even when used with constant interruptions, but when used continuously without interruptions one, or at most two, milliamperes are amply sufficient. The strength of the faradic current may be safely left to the sensations of the patient. Whatever can be borne without great discomfort is safe to use. To those who understand the exceedingly powerful influence of an induction current of quantity, when applied to surfaces that offer little resistance to its passage, it is at once evident that it is to be greatly preferred to currents of tension in exciting intestinal muscular contraction. In order that the resistance may be reduced to its minimum, both poles should be introduced into the bowel, using for this purpose a bipolar electrode. Induction currents of high tension, when applied to mucous surfaces, act mildly both on motor and sensory nerves. Indeed, so tolerant do these parts soon become to such a current that, even when the strength is very great, the patient may be entirely unconscious of its passage. The induction current of quantity, on the contrary, requires the exercise of the greatest caution. Excessive pain is occasioned by strong applications, and the parts do *not* become tolerant to its influence as the application continues. Impaired peristaltic action dependent upon constitutional conditions, the result of either acute or chronic diseases, demands more than local treatment. In addition to this local treat-

ment with the induction currents of quantity and by the bipolar methods, or more often entirely superseding it, the treatment by general faradization is beyond all question productive, in many instances, of the most beneficial results. For this purpose currents of comparatively high tension are required, and when thoroughly and judiciously applied, the method is sufficient to increase the processes of waste and repair, improving nutrition and imparting tone to the system generally and locally. The internal electrode should invariably be attached to the negative pole of the battery."

In case of lax, pendulous abdomen, a firmly applied abdominal bandage may prove helpful; its support affords increased energy in expulsive power of the abdominal muscles.

If immediate relief seems necessary, an enema of warm water, with milk, castile soap, or a small amount of lard added, is unobjectionable. It must be taken with the patient in the recumbent position and by means of a fountain syringe, the injection to be retained as long as possible. Glycerine suppositories are very efficient. Laxatives and cathartics are to be scrupulously avoided; they, no doubt, have done more toward firmly establishing habitual constipation than all other foolish habits combined. When their occasional use is absolutely unavoidable, bitter waters, as Hunyadi or Friedrichshalle, are to be preferred, or an aromatic syrup of cascara sagrada may be given. If impaction of fæces exists, a large injection of olive oil, from fifteen to twenty ounces, *slowly* administered, is excellent; it may have to be repeated, and should, in fact, be continued daily, in smaller amounts, until the removal of the entire mass has been accomplished.

The constipation of children must be treated as that of adults, with particular attention to diet and, if old enough, to immediate and patient obedience to the calls of nature. Infants demand very careful attention to diet. If breast-fed, they are often benefited by having given them two or three teaspoonfuls of cream before being put to the breast. If bottle-fed, Mellin's food is preferable, usually, to a pure milk-diet. Drinks of water should be frequently given; children are fond of water, and often receive a supply quite insufficient to maintain that softness and moisture of the stool which is a physiological necessity. Enemata, in case of small children, need not be large, a

few ounces being quite sufficient; glycerine in proportion of one part to three parts of water may be added when necessary. Suppositories of soap or glycerine excite a prompt evacuation, but should only be allowed when in a case of habitual constipation the child has been permitted to go too long without a stool.

Therapeutics.—The well-selected remedy is capable of yielding excellent results in the treatment of the constipation of both adults and infants. The following are especially reliable: **NUX VOMICA**. Frequent but ineffectual desire for stool; stools large and hard; colic; indigestion; dull heavy headache, especially in the morning; indigestion; general indisposition (“out of sorts”); irritability and despondency. In persons of sedentary occupation, fond of stimulants, in the habit of using irritating drugs. Constipation alternating with diarrhoea. “Bilious” condition.—**BRYONIA**. Stools large, dry and hard, as though burnt; passed with great difficulty. Indigestion, with heaviness and pressive pain in the stomach, especially after eating; bitter taste in the mouth; thickly coated, whitish-yellow tongue. Irritability of temper.—**OPIUM**. Constipation from intestinal inertia, especially of the rectum. Has no inclination to stool. Stools hard, dark-brown, in small, hard balls. Severe flatulent colic in upper bowel.—**PLUMBUM**. Characteristic violent colic, with tense, drawn-in abdomen; jaundice; stools small, hard, like sheep-dung; constant urging to stool, with pressure. Constipation with irritability and constrictive spasm of the anus, “especially with the sensation of a string pulling the anus into the rectum” (T. F. Allen). In infants, stools hard and crumbled.—**LYCOPodium**. Chronic persistent constipation, with hard stool and spasmodic and painful constriction at the anus, the stool being followed by pain and soreness in the rectum and anus. Gurgling and rumbling in the abdomen from flatulency. Chronic disease of the liver. Chronic gastric catarrh, with great gastric flatulency; acid, chronic, atonic dyspepsia, mental depression, copiously bleeding hæmorrhoids.—**ALUMINA**. Particularly useful in children. Stools very hard; rectum inactive, dry, inflamed. Bleeding after the painful expulsion of large, dry hard stool. Stool soft, like putty, expelled only after much effort; the rectal and abdominal muscles combined are unequal to the task.—**GRAPHITES**. The stools

are large and covered with mucus. Distension from flatulency of moderate severity. Indigestion, with pain in the stomach some hours after eating. Itching, moist eczema, especially behind the ears. Hæmorrhoids.—SULPHUR. Habitual constipation with irritability and dryness of the rectum and soreness and burning at the anus; frequent, ineffectual desire for stool; hæmorrhoids; liver-trouble; rush of blood to the head; cold feet. After stool the anus is so sore that he cannot lie down or sit down; prolapsus ani.

Hæmorrhoidal affections being frequently associated with constipation, their presence may further suggest: *ÆSCULUS HIPPOCASTANUM*. Piles purple; protrude; bleed slightly; fulness and bearing-down; sensation as of sticks in the rectum; aching pain and lameness in the back; dry, hard stool.—*ALOES*. Piles protrude like a bunch of grapes, with constant bearing-down in the rectum; stools mucous, jelly-like; hæmorrhoids swollen and sore, can hardly use the toilet paper; soreness relieved from the use of cold water.—*BELLADONNA*. Profuse arterial bleeding from the piles; congestion; sensitiveness and soreness, so he must lie with the nates spread apart.—*LACHESIS*. Stitching pain upwards in the pile-tumor, when coughing. Beating in the anus as from little hammers. Hæmorrhage of dark blood, which does not coagulate easily.—*NITRIC ACID*. Painful, pendulous hæmorrhoids that have ceased to bleed. Ulceration of the rectum, with severe pains after stool. Fissure of the anus, with oozing of fetid moisture and intense rawness and smarting.

ENTERALGIA.

Enteralgia, enterodynia, intestinal colic, may be considered in the light of a neuralgia of the intestine.

Ætiology.—The *predisposing* causes are such as play an important role in the causation of a neuralgia in any other portion of the body. They are: inherited predisposition, neurotic temperament, and such conditions as lower and vitiate the general tone of the system. Among the latter, worrying and fretting, overwork, living amid unhealthful surroundings, im-

proper food and clothing, and debilitating, exhausting diseases are conspicuous.

Immediate, *exciting* causes are: local irritation of the terminal intestinal nerve filaments by the presence of some irritating substance (hard fæces, enteroliths, gall-stones, worms, etc.), of some foreign body in the canal, or of the presence of some indigestible, spoiled article of food or of substances undergoing fermentation (unripe fruit, sour milk, etc.). Some persons suffer easily from substances which to others are perfectly harmless (strawberries, shell-fish, veal, lemonade, etc.), an idiosyncrasy which is well known. Enteralgia may be reflex, as in diseases of the uterus, ovaries, liver, kidney, spleen, pancreas; it may occur in connection with certain diseases capable of profoundly affecting and depressing the entire organism (as anæmia, malaria), in nervous affections (crises of locomotor ataxia, hysteria, hypochondriasis), and as the effect of the constitutional action of certain poisons, as lead, arsenic, and copper.

Symptoms.—Pain in the bowels is the one symptom which overshadows all else. It may begin lightly, gradually increasing in severity until it is almost unbearable, or its onset may be sudden and the violence of the pain very great from the start. The pain is usually at or near the umbilicus, radiating throughout the abdomen, more rarely of a “shifting” character. It is cutting, pinching, stabbing, tearing and agonizing in all but exceptional cases, in which it may be dull and grumbling. Occasionally it is almost continuous, but in the greater number of attacks paroxysms of intense aggravation are felt, gradually increasing, and followed by periods of comparative, but rarely complete, rest. In many cases some relief is felt from pressure, and often the patient bends over a chair or some other convenient hard article to get the benefit of hard, firm pressure. Sometimes, however, great abdominal tenderness exists. The skin of the abdomen is tense, and its walls hard and drawn-in; occasionally there is abdominal distension. Excited peristaltic action shows itself in the powerful contractions of the intestinal coils, which can be seen upon inspection; these are commonly accompanied with violent bearing-down sensations. Restless tossing about, loud moans and cries, with a drawn, anxious, haggard face and cold bodily surface bear

witness to the agony which is endured. Nausea and vomiting often exist; constipation is the rule, with occasional urging to stool and vain endeavors to bring about an evacuation; at times there is looseness of the bowels. The pulse is almost always slow and hard, and there is neither fever nor thirst.

If the patient is of an exceedingly nervous temperament, various reflex symptoms may occur, such as distressing palpitation of the heart, dyspnœa, hiccoughing, dizziness, faintness, cramps and, particularly in children, general convulsions.

The attacks last from a few minutes to several hours, and usually leave the patient as abruptly as they came. They recur at varying intervals.

Diagnosis.—The diagnosis rarely presents any difficulty. At first glance some inflammatory affection of the intestine might be suspected, but the absence of fever, including thirst and bodily heat, and the relief from hard pressure, with the intense character of the pain and the abandon with which the patient tumbles about, are alone quite sufficient to do away with this impression. *Rheumatism of the abdominal muscles* lacks the relief from pressure and the spasmodic character of the pain; the rheumatic pain is also more superficial and worse from motion, and there is the probability of rheumatic manifestations in other parts of the body. *Intestinal obstruction* is differentiated by the localized and continuous character of the pain, the absolute constipation, and its peculiar (stercoraceous) vomiting.

The prognosis is good so far as it concerns recovery from the individual attack, fatal cases being of very rare occurrence. Frequent recurrences may take place at short intervals and exhaust the strength of the patient, thus becoming a factor of some importance in the fate of those already suffering from some other constitutional affection. Whether, or not, a radical cure can be accomplished depends largely upon our ability to reach the primary disease.

Treatment.—The treatment of the individual attack must be directed to the removal of the exciting cause, and when this lies in the presence of some irritating substance in the intestine it can usually be brought about by the use of a smart cathartic or a copious enema of hot water. The relief of pain is equally important, and to this end hot applications to the abdomen—

either in the form of poultices or cloths wrung out of hot water—or turpentine stupes, should be made constantly, as hot as the patient can endure, and changed at brief intervals. A hot mustard foot bath is serviceable in milder cases. If the suffering is intense, it is perfectly proper to use Hoffman's anodyne, spirits of ammonia, chloroform or subcutaneous injections of morphia.

The permanent cure of the patient, in addition to such measures as are directed against the primary disease, consists of everything tending to build up his strength and to increase his vitality and powers of resistance. Whatever accomplishes this, is good and appropriate treatment.

Therapeutics.—**ARSENICUM.** Attack comes on suddenly. Periodical, burning, cutting pain, with great anguish; relieved by the application of heat; when a paroxysm is over, he is utterly exhausted. Vomiting with pain in the stomach. He is sure that he is about to die. Chronic malarial poisoning. The symptoms are so severe that fears of some inflammatory condition seem justified.—**ASA FÆTIDA.** An excellent remedy for hysterical women, when the flatulence is excessive, the abdomen greatly distended, and the peristaltic action of the intestines much excited; trembling and faintness of the heart, or violent, irregular palpitation, with dyspnœa; spasmodic jerking and twitching. The hysterical element is pronounced.—**BELLADONNA.** Spasmodic, clawing, pinching pain, with excessive distension of the abdomen, or sausage-like protrusion of coils of intestine, and much gurgling in the bowels. Extreme sensitiveness of the abdomen to touch, yet moderate pressure often relieves; head feels full and aches; face red and congested.—**COLOCYNTHIS.** Intense, constrictive, pinching, colicky pain about the navel, extending in every direction and hardly endurable; aggravation from motion, relief from hard pressure, from the escape of flatus, and from drinking hot coffee. "Tight, cramp-like pain in the left ileac and umbilical region, which is worse after (not during) external pressure, especially observed in women after excess in venere" (Raue).—**CUPRUM.** Intense colic, cutting as though a knife were being drawn through the intestines and into the back, extorting violent screams; patient perfectly frantic with pain; cramps in the abdominal muscles, sometimes extending into the muscles of the extremities. Con-

vulsive vomiting; hiccoughing; collapse.—DIOSCOREA. Intense cutting, twisting colic, better from pressure, radiating from the abdomen into the back, chest and arms. Severe pain in the left ileac region, running upward, toward the left kidney, better from bending forward, from crouching forward, with the hands clasping the knees. Gripping and distress in the umbilical and hypogastric regions; with intermittent cutting in the stomach and small intestines.—NUX VOMICA. Colic from indigestion, with pressure upward, causing shortness of breath, and downward, causing desire for stool, with general soreness, constipation, and desire for stool plainly felt *all through the bowels*.—OPIUM. Obstinate constipation, with flatulent distension of the small intestine, giving rise to an urgent desire for stool, which increases the cutting, pressive, twisting pain.—PLATINUM. In hysterical women, subject to irregular and painful menstruation and sexual melancholia (the latter in both sexes). Constrictive colic; pain extending from the umbilicus to the back. Obstinate constipation; frequent desire for stool; feeling as though the rectum were overburdened with stool, but the evacuation is small and painful.—PLUMBUM. General anæmia; intense tearing colic, almost impossible to endure, about the navel; umbilicus drawn in toward the spine; the abdomen is tense and hard; extreme distension of the transverse colon; tympanitic distension of the abdomen, with circumscribed swellings as large as the fist. Stubborn constipation.—VERATRUM ALBUM. The entire stomach much swollen and sensitive. "It is adapted to the most terrible attacks of colic; the pain begins in the stomach, radiates upward toward the shoulder, and then involves the whole abdomen, associated with retching, vomiting, purging, coldness, cold sweat" (T. F. Allen). There is often a great deal of flatulence, with a feeling as though the intestines were twisted into a knot, with intense colic; it seems as though the intestinal canal were absolutely closed, so he cannot pass the least flatus.

Enteralgia in children: PULSATILLA, COLOCYNTHIS, RHEUM (everything smells sour about the child), STANNUM (better from resting the abdomen upon the point of the shoulder), IPECACUANHA, CUPRUM.

From indigestion: PULSATILLA (fat, pastry), NUX VOM. (over-eating, coffee), ARSENIC (iced water; ice-cream), IPECACUANHA (unripe fruit and vegetables).

From mental excitement: ACONITE (anger, fright), COLOCYNTHIS (indignation), IGNATIA (from grief or indignation), OPIUM (sudden fright), NUX VOMICA (violent anger; with acute jaundice).

MISCELLANEOUS AFFECTIONS OF THE INTESTINES.

Ulceration of the intestines is of frequent occurrence and has already been discussed in connection with diseases of the intestinal tract. It is practically a *symptom* which demands special consideration and classification because of the frequency with which it is seen.

Primary inflammatory ulceration may occur in the course of inflammatory action in any part of the intestine, as an independent lesion or secondary to some other affection, as Bright's disease or typhoid fever. It is more common in the large intestine and more likely to be found at points where there is delay in the passage of fæces (cæcum, sigmoid flexure, rectum) and where structural peculiarities favor the development of an enteritis. Ulceration resulting from the separation of necrosed tissue is seen in connection with amyloid and other forms of degeneration and with the so-called peptic ulcer. In the intestine, the peptic ulcer is almost always duodenal, sometimes jejunal; it occurs much oftener in men than in women; it is also seen in connection with superficial burns, or reasons not yet understood. Ulceration of new growths is seen in cancerous and syphilitic growths, tubercular masses, etc. Ulcers may be single (duodenum) or multiple (typhoid or ulcers of the colon). In the latter form extensive destruction of the mucous membrane is common. The peptic ulcer is "punched-out," with sharp, well-defined edges, the adjacent mucous membrane presenting a normal appearance. Other ulcers present irregular, thickened, and often overhanging borders with undermining of the adjacent tissues, and a base the nature and appearance of which depends upon the layers involved or the structures to which it may be joined by inflam-

matory adhesion. The ulceration of malignant growths presents the characteristics of tissues undergoing necrosis, with the histological features which belong to the new growth. The "old" ulcers of dysentery, typhoid fever and tuberculosis consist of ash-gray, pigmented sloughs extending in the long axis of the bowel or following the distribution of the lymphoid tissues along the course of the blood-vessels and lymphatics.

Ulceration of the intestine may be acute or chronic. Acute ulceration terminates in resolution or goes on to perforation. In chronic ulceration inflammatory deposits and adhesions are conspicuous features; perforation may take place. Constriction of the parts from cicatrization in the process of healing is frequent and has been discussed in preceding chapters.

The **symptoms** are few and not characteristic; they are usually overshadowed by the symptoms of the affection of which the ulceration is an incident or by the symptoms of conditions (such as perforation) which may result from it. Ulceration may exist and not be suspected during life. Pain is often present, but its severity is no indication of the extent of the ulceration. Thus a perforating duodenal ulcer may give no trouble whatever until perforation occurs or a fatal termination is about to take place, while a typhoid ulceration, healing perfectly, may be accompanied with intense suffering. The passage of bright blood in the stools is of frequent occurrence and becomes of diagnostic importance when there is an admixture of the specific products of the ulcerative process (pus, portions of tissues, tubercles, cancer cells, etc.).

Pepper enumerates the following forms of ulceration: round ulcers of the duodenum; follicular ulcers (enteritis of children, chronic enteritis of adults, dysentery); catarrhal ulcers (in the mucous membrane proper); stercoral ulcers (from retention of hardened fecal matter; most frequent in the vermiform appendix, cæcum, sigmoid flexure); ulceration due to lesions without the intestine (tuberculosis or other disease of adjacent organs); dysenteric ulcer; ulcer of typhoid fever; tuberculous ulceration (usually in the lower part of the ileum); syphilitic ulceration (often transverse or annular); cancerous ulceration; toxic ulceration (corrosive poisons); traumatic ulceration (from foreign bodies); mycotic ulceration (variola, anthrax, actinomycosis).

Hæmorrhage from the bowels is largely confined to middle age, occurs oftener in men than in women, and is rare in children. The term "melæna" is somewhat loosely used to express a flow of dark, tar-like blood from the intestine, as melæna neonatorum, vomiting and passages from the bowels of dark, tar-like blood a few hours after birth, an affection which usually proves fatal in a short time.

The most practical arrangement of the *causes* of intestinal hæmorrhage is that by Allchin: a. Increased blood-pressure (intense hyperæmia or extreme congestion); b. Affections of the intestinal wall (injuries of the bowels; ulceration; vascular growths and hæmorrhoids; amyloid disease of the walls). c. Primarily altered blood states (purpura hæmorrhagica; leucocythæmia; yellow fever and severe intermittent fever). d. Occasional causes (rupture of aneurism into the intestine; vicarious menstruation).

Symptoms.—If the bleeding is trifling, no constitutional disturbances are noted; if severe, they are those of bleeding from any other part, i. e., anæmia, faintness, dizziness and pallor, with failing pulse, sometimes, as in the present case, with the sensation of warm fluid in the bowels. The symptoms due to the fundamental affection are usually present. The blood commonly is dark, almost resembling tar, from the action of sulphuretted hydrogen in the intestine upon the hæmatin of the blood. The longer the blood has remained in the intestine, the more pronounced this action; hence, bleeding from the small intestine is characterized by very dark color of the blood. When the blood is bright, it may be assumed that it comes from the rectum or anal orifice, save in those cases where the hæmorrhage is very large and the blood is hurried so rapidly through the intestinal canal that this change can be accomplished only to a limited extent. Experience has taught that stools covered with blood prove bleeding from the colon.

There may, however, be no external signs of bleeding while serious internal hæmorrhage is taking place. Cases of fatal hæmorrhage are on record in which the bleeding was not even suspected. There may be increased abdominal dulness.

The **prognosis** depends almost wholly upon the general condition of the patient, especially upon the state of the pulse. The loss of a moderate amount of blood may be of genuine

benefit in that it equalizes a previously disturbed circulation. Trousseau maintained that in typhoid fever, for instance, improvement often follows a moderate internal hæmorrhage.

Treatment.—Absolute rest in bed. Abstinence from food. Endeavors to draw the blood to other parts by sinapisms or dry cupping. Opium, to stop peristalsis. If the bleeding is severe and within reach, injections of equal parts of perchloride of iron and water may prove useful; if from piles, make a direct application of a strong solution of the same in glycerine. Hamamelis, similarly used, has given good results. If the case is urgent, subcutaneous injections of ergotin, two grains dissolved in glycerine, repeated when necessary, may arrest the bleeding by producing contraction of the vessels. The use of stimulants, though suggested by the general condition of the patient, is of questionable value on account of their action upon the heart; they should be exhibited only when absolutely indispensable. Injections of very hot or very cold water, ice to the abdomen and small pieces of ice swallowed are measures which readily suggest themselves. In extreme cases the injection of a solution of common salt must not be neglected (see Hæmorrhage from the Stomach).

The following remedies may prove helpful: **BELLADONNA.** Congestion. Bleeding from the rectum (hæmorrhoids). Blood bright-red and hot. Sensation of a warm fluid in the abdomen.—**ARSENICUM.** Hæmorrhage of dark blood, occurring in connection with cancer, typhoid fever, purpura; long-continued; with great restlessness, anxious face and extreme prostration.—**IPECACUANHA.** Hæmorrhage profuse, bright-red. Constant nausea.—**HAMAMELIS.** Painless hæmorrhage of dark, thick blood. Hæmorrhoidal bleeding. Fulness and throbbing in the rectum.—**CARBO VEGETABILIS.** Hæmorrhage in connection with low fevers, in purpura hæmorrhagica and in yellow fever; coldness of the extremities, especially of the knees; coldness of breath pulse thready; almost collapse.—**CHINA** is more useful in overcoming the effects of heavy loss of blood than in controlling the bleeding. It may do good work when the patient, especially a person already debilitated by exhausting disease or old age, is suffering from ringing in the ears, dizziness, faintness, coldness of the extremities, etc.

Cancer of the intestines is a disease preferably of middle life,

less frequent than cancer of the stomach. It may be primary or secondary. When the latter, it is often due to extension to the rectum from the uterus or vagina or to the duodenum from the stomach, pancreas or liver.

The primary growths are chiefly those varieties which are found in the stomach (see Cancer of the Stomach). The disease usually begins in the mucous and submucous coats, spreading, and finally involving all the coats of the intestine. More rarely, as in the colloid cancer, it extends from without (peritonæum) inward. The mesenteric glands are always involved. In all forms there is degeneration and ulceration, with incidental adhesions to adjacent tissues (abdominal wall, uterus, adjacent coils of intestine), most marked in the soft varieties. The latter may form large masses protruding into the gut, giving rise to obstruction. The hard varieties, as scirrhus, grow slowly, forming a hard cancerous infiltration. Frequently (in scirrhus and encephaloid) the entire circumference of the intestine is involved, constituting an annular cancer which gradually lessens the lumen of the bowel and may result in obliteration of the intestinal lumen. Exceptionally, dilatation is seen with the annular growth. Fistulous openings through the abdominal wall, abscess-formation and perforation may occur incidentally.

The symptoms are not characteristic and in the early stage cannot be recognized, being those simply of indigestion and slight intestinal disturbance. Gradual loss of flesh, without apparent cause, is often the first intimation of possibly existing malignant disease. The existence of intestinal cancer may be inferred when cachexia becomes pronounced, with rapidly progressing emaciation, tenderness on pressure and soreness at some particular spot, abdominal fulness and symptoms pointing to the presence of a tumor, diarrhœa alternating with constipation, or stubborn constipation, or the band-like stools described in connection with *constriction* of the bowels. Pain is rarely present, save when the rectum is involved.

Malignant disease much oftener involves the large intestine than the small, and the rectum about four times as often as it does all other parts of the bowel. If in the *rectum*, the first signs are usually found just within the sphincters, in the greater number of cases extending upward and downward simultane-

ously. In due time there is contraction of the parts, often extreme, with possible and extensive breaking-down of the structure. Very obstinate constipation exists early, with often frightful pain when the bowels move. Eventually the sphincters may become practically useless, and then occurs constant and uncontrollable oozing from the rectum of thin, very offensive faecal matter.

The diagnosis is difficult, often impossible, save when located in the lower part of the large bowel.

The prognosis is unfavorable.

Treatment is surgical; the physician must endeavor to sustain the vitality of the patient, lessen the pain, remove the offensive odor by the use of disinfectants, and make life endurable.

ARSENICUM, HYDRASTIS, KREOSOTE, CONIUM and CARBO ANIMALIS may aid in meeting these indications.

Amyloid degeneration occurs in connection with amyloid disease in other parts of the organism, usually in the course of some disease attended with protracted suppuration, as tuberculosis, syphilis, etc. Involvement of the intestine must be considered proof that the disease is far advanced, in fact approaching a fatal termination. It first involves the mucous layer and gradually progresses until the entire bowel is included in the change. The solitary and agminated glands resist for a long time, and may even remain unaffected. The appearance of the mucous membrane to the naked eye is that of colorless, wet wash-leather, somewhat glistening. It has the chief characteristics of amyloid degeneration elsewhere: doughy toughness, waxy lustre, vitreous translucency, and lack of color. The chemical test alone is decisive (wash the surface to be tested so it is free of blood, paint it with a brush dipped in an aqueous solution of free iodine; in a few minutes the amyloid matter is colored violet or like mahogany. If sulphuric acid is added, the mahogany color changes to blue).

The symptoms are: chronic, moderate, usually painless, diarrhoea, with slight tinge of blood; in exceptional cases, free hæmorrhage.

The diagnosis depends largely upon the presence of amyloid changes elsewhere.

The prognosis is hopeless and the treatment merely symptomatic.

Affections of the mesentery are: hæmorrhage, disease of the mesenteric arteries and veins, disorders of the chyle vessels, and cysts of the mesentery. Of these, *hæmorrhage* is almost always associated with bleeding of the pancreas or with retroperitoneal hæmorrhage; it may also occur in rupture of an aneurism of the abdominal aorta or superior mesenteric artery and in the course of malignant infectious fevers. Diseases of *mesenteric arteries*. Aneurism is very rare and scarcely ever recognized. Embolism and thrombosis are more frequent; blocking of the superior mesenteric is followed by violent colicky pain, diarrhœa, vomiting and abdominal distension, with fatal termination. Resection of the bowel suggests itself as a possibly advisable form of treatment. *Dilatation* and sclerosis of the mesenteric *veins* is seen in connection with cirrhosis of the liver. Suppuration of the mesenteric veins occurs with pylephlebitis. "The mesentery may be much swollen and is like a bag of pus, and it is only on careful dissection that one sees that the pus is really within the channels representing extremely dilated mesenteric veins." Changes in the *chyle-vessels* usually depend upon varicosis or consist of the formation of cysts. They are rare and of slight importance to the general practitioner. *Cysts* of the mesentery have of late attracted much attention. They may be dermoid, hydatid, serous, sanguinous or chylous. In size they range from that of an insignificant enlargement to a tumor occupying the entire abdomen. Adhesions may form to any of the abdominal viscera. The symptoms are those of an abdominal tumor of progressive growth, sometimes accompanied with colic and constipation, rarely with loss of general health. The tumor is usually situated in the middle line and presents no reliable diagnostic points. It has been mistaken for ovarian tumor, movable kidney, hydronephrosis and cysts of the omentum. Treatment consists of laparotomy and enucleation of the cyst.

DISEASES OF THE LIVER.

CONGESTION OF THE LIVER.

Reference is made here only to that passive congestion which is the result of mechanical obstruction to the outflow of blood from the liver. Congestion which is part of a physiological pro-

cess, as digestion, or which occurs in connection with malarial and other infectious diseases, will not be considered.

Ætiology.—The causes are local and distant. Constriction above (as from a corset), pressure of a tumor upon branches of the hepatic vein or obliteration of the hepatic vein by thrombi belong to the former. Distant causes are: obstruction of the circulation of the blood through the heart (non-compensated valvular disease, temporary or permanent weakening of the heart muscle) or lungs (bronchitis, fibrous pneumonia, emphysema, asthma, chronic pleurisy, atelectasis); or in both heart and lungs (pressure from malformation of the spine, tumor, aneurism, extensive pleuritic effusion on the left side); or compression of the inferior vena cava from aneurism or tumor.

Pathology.—A primary symmetrical enlargement of the liver, with tense, smooth, shining capsule and great fulness of the blood vessels is eventually followed by slowly developing atrophy of the liver. The primary enlargement is especially marked in the thickness of the organ. The secondary changes are chiefly due to derangements of function and nutrition in the liver, arising from dilatation of branches of the hepatic vein, with hypertrophy of their walls, exerting pressure upon the cells immediately surrounding them; this results in wasting and disappearance of these cells, whose place is supplied by connective tissue of granular appearance, causing increased density of the liver and diminution of its size. There is also dilatation of the veins supplying the gastro-intestinal mucous membrane, with increased density and dark coloring of the spleen, pancreas and kidneys.

Symptomatology.—Local symptoms at first are absent. Later, there is in the region of the liver, with the enlargement, a sense of fulness and weight, most keenly felt when turning to the left side, in bed, or when sitting up. Occasionally there is much shortness of breath and pain extending from the liver to the right shoulder. Tenderness upon pressure may be felt. Both enlargement and pain are readily aggravated from exertion and disappear again after resting. Slight jaundice is common, though in many cases both urine and fæces are normal. Symptoms of "biliousness" are common, such as bad taste in the mouth, loss of appetite, mild indigestion, headache, dizziness, and mental depression. When there is gastro-duodenal catarrh,

as is common when the heart is affected, the gastric disturbances may reach considerable severity.

Physical examination shows more or less fulness on the right side. Palpation readily detects the enlargement; the finger tips of the right hand, pressing inward and upward while the abdominal wall is relaxed, can usually locate the lower edge of the liver and may even find the notch between the right and left lobes. Percussion elicits a flat sound an inch, or more, below the margin of the ribs, on the right side.

After the liver has become atrophied, these signs fail; but general œdema and ascites are then usually present.

The diagnosis depends upon the presence of characteristic physical signs and of such conditions, already enumerated, as may cause it. The temporary increase of the enlargement from exercise and its subsequent lessening from rest are particularly noteworthy.

The prognosis is not good, since the condition depends upon causes almost wholly beyond the reach of medical skill.

Treatment consists of the use of such remedies as are symptomatically indicated and close attention to an appropriate diet. The latter must consist of articles of food both easily digested and nourishing. Overeating must be carefully avoided. Highly seasoned foods and alcohol in any form are to be excluded; meat must be taken in restricted amounts. The occasional use of mineral waters (Hunyadi, Friedrichshalle, Congress) is advisable to keep the bowels open. Heart-tonics are often called for (*DIGITALIS*, *STROPHANTHUS*, *CONVALLARIA*, *CACTUS*, etc.).

Therapeutics.—*MERCURIUS SOLUBILIS* or *MERC. DULCIS*, in the low triturations, is perhaps the most valuable remedy here, as it also is in the state so constantly referred to as "biliousness." The tongue is dirty-white, coated heavily, soft and flabby, bearing the imprint of the teeth; breath fetid; pressive pain and soreness in the liver; liver sore to touch; abdomen swollen; skin looks dirty, icteric. Derangement of the stomach; stools greenish-brown, irregular, now almost constipated, then liquid and bright yellow.—*NUX VOMICA*. Heavy throbbing pain in the region of the liver, as from an ulcer; fine, stinging pains in the liver; creeping chills in the region of the liver; liver swollen, hard, sensitive; jaundice, with aversion to

food and short fainting-turns; useful in persons fond of high living, in the habit of using stimulants, of constipated, hæmorrhoidal tendency.—CHELIDONIUM. Enlargement of the liver (Burnett: in perpendicular line), with cough and pain under the angle of the right shoulder blade; tongue yellowish-white; bitter taste in the mouth. Sharp, stitching pains in the liver, into stomach or back. Tightness and pain in the right side during inspiration; abdomen distended and sensitive to pressure. Headache, weariness; anorexia.—AGARICUS. Painful dragging as if the great weight of the liver were pulling on the ligaments. Sharp stitches as from needles. Dull stitches during breathing. Gastric catarrh. Profuse emissions of inodorous flatus.—AURUM. Hepatic congestion (enlargement) with heart disease; jaundice; pain in the liver; foul, putrid taste; constipation of grayish or ashy-white stools; greenish-brown urine. Burning and cutting in the right hypochondrium. Characteristic melancholy.—CARDUUS MARIANUS. Hyperæmia of the liver, with sluggish action of that organ, with jaundice, constipation, heavy, stupid head, foul tongue, fulness and soreness over the region of the liver, sometimes with cough; the tongue is usually furred; there is usually nausea and vomiting of green fluid (T. F. Allen). Liver spots on the skin.—MAGNESIA MURIATICA. Slight jaundice (conjunctivæ and face); light-colored gray stools. Tongue large, coated yellow, scalloped at the edges. Offensive breath. Sour vomiting. Scanty, albuminous urine. Cannot lie on the right side. Tenderness over the region of the liver; pain extending to the spine and pit of the stomach; weak, small pulse; stools crumble as soon as they are evacuated. In puny and rickety children.

Consult also: AMMONIUM MURIATICUM, EUONYMIN, PODOPHYLLUM, SELENIUM, SULPHUR.

PERIHEPATITIS.

An inflammation of that portion of the peritonæum which covers the liver; it occurs as a circumscribed peritonitis affecting only the portion standing in close anatomical relation to the liver or as a part of a general peritonitis. It may be acute or chronic.

Ætiology.—The acute form is usually the result of traumatism (a blow or cut) or of such injury to the structure as may arise from the formation of an abscess or from ulceration or perforation of closely related organs (as perforating ulcer of the stomach, duodenum, renal abscess, appendicitis, suppurating bile-ducts, etc.). It also occurs as a feature of disease of the liver itself and as the result of extension of inflammatory action from some neighboring organ (right-sided pleurisy). It almost always affects the right lobe, save when resulting from splenic disease, as abscess or rupture, in which case the left lobe is involved. The chronic (fibrous) form is the outcome of persistent irritation, as from the pressure of corsets or from habitually maintained bending forward, as is necessary in some occupations; or from the pressure exerted upon the parts by growths (cancerous and other nodules); or from extension of inflammation from some neighboring organ (chronic pleurisy).

The pathological condition in acute perihepatitis is that of a peritoneal inflammation limited to the peritoneal covering of the liver and corresponding lower surface of the diaphragm, with adhesions between the opposed surfaces. These adhesions, more or less complete, may form a pouch containing pus, often in considerable amounts (subphrenic abscess), which is of bright-yellow ochre color, from the admixture of bile and bilirubin crystals. The pus cavity may also contain gas or air, in which case the term "subphrenic pyopneumothorax" is applied to it. In the chronic, fibrous form the peritonæum is thick, dense, opaque, with band-like adhesions to adjacent organs and structures. Globular or lobulated atrophy of the liver may result, with narrowing or obliteration of the hepatic and portal veins or of the cystic or common bile ducts.

Symptoms.—The symptoms are those of a peritonitis in the hepatic region, with tenderness upon pressure, motion and deep inspiration, with fever and slight jaundice. If associated with perforation, the local symptoms are intense, with superficial breathing and high fever, often preceded by a severe rigor. Loss of appetite, nausea and, less often, vomiting may be present. The physical signs are distension in the right hypochondria, with dulness on percussion.

The *course* of the disease is rapid and favorable, except when

it is an incident in the course of some other lesion of grave character. If suppuration takes place, the course of the disease is tedious and complicated by possible rupture of the sac into the lung, stomach or intestine, possibly externally through the abdominal wall. The question of drainage then becomes one of prime importance. Cicatrization of tissue may result in extensive contraction of the parts, compressing the portal and hepatic veins and bile ducts, and resulting in chronic jaundice and ascites.

Diagnosis.—The physical signs may suggest a pleuritic exudation, but the absence of cough and expectoration and the displacement of the heart, while the symptoms refer to the stomach, duodenum and liver, and the pronounced bulging in the right hypochondrium, should establish a clear differentiation. An exploratory puncture (in the seventh or eighth interspace in the axillary line) may be demanded. The presence of bile pigment in the pus is characteristic.

Treatment.—Hot applications (stupes, fomentations, etc.) and mustard drafts over the liver, leeches, absolute rest and a rigid diet are indicated. The nature of the primary disease must receive careful consideration. As soon as the presence of pus is established, surgical measures must be employed. Internal medication is directed to the relief of the inflammation and to the control of the suppurative process.

ACUTE PARENCHYMATOUS HEPATITIS.—YELLOW ATROPHY OF THE LIVER.

Yellow atrophy of the liver is rare, whether occurring as a primary disease or as a secondary affection in the course of other lesions of the liver or of constitutional diseases.

The primary form, with occasional exceptions, attacks young adults not over thirty-five years of age, with a preference for women, especially in their later pregnancies. The onset is very sudden and extremely violent, and the termination fatal. Its causation is as yet a matter of speculation. The secondary form is also rare. It is seen in connection with cirrhosis or other disease of the liver and in the course of certain infectious and constitutional diseases, as typhoid fever, recurrent fever, septicæmia, puerperal fever.

Pathology.—The liver is atrophied to one-third or one-half

its natural size, very much flattened in shape, looking almost like a pan-cake, of flabby, doughy feel, with its capsule wrinkled. It is of yellow, saffron-like color, presenting, upon section, irregularly distributed alternating patches of red and yellow. The condition is one of fatty degeneration of the hepatic cells of the entire organ. The fatty matter being readily absorbed by the lymphatics, eventually only the blood vessels and connective tissues are left. When the former are congested, as is commonly the case, they form the red spots described. Crystals of leucin and tyrosine may be seen in the tissues after exposure to the air.

In connection with these changes in the liver, fatty degeneration takes place also in the kidneys, heart and, less often, in the (voluntary) muscles. Enlargement of the spleen is always present. The skin and tissues of the body are tinged with bile. There are small hæmorrhagic effusions in the gastric and intestinal mucous membrane, in the serous membranes of the kidneys, sometimes in the brain and heart. The serous cavities contain an excess of fluid.

Symptoms.—The prodromal stage, which in some cases is wholly wanting, consists of languor, indisposition, loss of appetite, gastric uneasiness with belching, nausea and sometimes vomiting, slight headache, slight jaundice, and occasionally moderate fever. The second stage, which often marks the first noticeable deviation from health, begins with a decided aggravation of the jaundice and a train of nervous symptoms of extreme severity from the very first. There is violent headache, with much restlessness and insomnia, with dulness of intellect, slow and indistinct articulation, and rapidly developing, extremely violent delirium, with local spasms and, rarely, general convulsions. After one or two days the violence of these symptoms abates, the patient quiets down, drifts into a state of sopor which develops into profound coma and terminates in death. The pulse at first is slow, then variable, and at last rapid and weak. There is little, if any, fever. A decided rise of temperature, to 106° , or more, or a fall to sub-normal, usually precedes death. Hæmorrhages from the stomach, bowels, nose, kidneys, female genitalia or skin, are always present and persistent. The urine usually is scanty, sometimes suppressed, acid, and of increased specific gravity. It is slightly albuminous, strikingly deficient in urea, and con-

tains bile pigments, bile acids, creatine, leucin, tyrosine, and hyaline and fatty casts. Vomiting may be severe, especially when the brain symptoms first appear. The stools are clay-colored and hard. In the case of a pregnant woman, abortion, with excessive flooding, is almost sure to occur.

The physical signs consist chiefly of a progressively diminishing area of dulness in the region of the liver. This is not so noticeable at first, and it may be absent in cases which rapidly progress to a fatal termination. Attention has been called to a tenderness in the region of the liver which is so exquisite that the patient, even in coma, manifests pain from slight pressure.

The duration of the first stage varies; the second stage, counting from the appearance of the cerebral symptoms, lasts from two to four or five days, not often longer.

The termination is invariably fatal.

Diagnosis.—The first stage is as free from characteristic symptoms as the second is marked. In the latter a mistake can hardly be made, except as phosphorus poisoning might be suspected.

Poisoning with phosphorus has more pronounced gastric symptoms; the liver remains of normal size for a longer period; hepatic pain and tenderness are usually more intense; the brain symptoms set in earlier (if the prodromal stage is counted); there is less maniacal delirium, and the urine contains little, if any, leucin and tyrosine.

Treatment consists of such relief as may be afforded by energetic attempts to control the vomiting (ice by the mouth; morphia?), application of cold water to the head, and stimulants when required.

We know of no remedy offering clinical proof of value in this condition. PHOSPHORUS naturally suggests itself as an almost similitum, but I know of no case of yellow atrophy of the liver which was cured by it. LACHESIS, ARSENICUM and BELLADONNA deserve careful study.

SUPPURATIVE HEPATITIS—ABSCESS OF THE LIVER.

Ætiology.—Abscess of the liver is a disease of adult life, rarely occurring in the very young or in the aged; it attacks women in only five or ten per cent. of all the cases. It is due

to the action of pyogenic, infectious irritants (bacteria; amœbæ; chemical?), which may invade this organ in connection with traumatism or are carried to the liver from other organs by means of the blood vessels or bile ducts. Of the blood vessels, the *portal vein* is particularly active in gathering, through its tributary vessels, disease products from various structures and organs, eventually depositing them in the liver; thus almost any disease, especially suppurative processes, within the structures reached by its ramifications may furnish the material from the action of which results hepatic abscess. It is, however, an abundantly demonstrated fact that of all the possible causes of infection, including the ulceration of tuberculosis and typhoid fever, the products of dysenteric ulceration are especially liable to produce this lesion. Waring's tables show that dysentery had existed in about three-fourths of all the cases collected by him. Nevertheless, as stated, other diseases of the intestines, especially of the large intestine, such as typhlitis, proctitis, hæmorrhoids or even trauma from operations, may be followed by hepatic abscess.

The *hepatic artery* becomes the channel of infection in case of suppurating wounds of the head and in such processes as ulcerative endocarditis, putrid bronchitis, suppuration about an aneurism, etc. Embolism of the hepatic artery *per se* is an infrequent cause, although a bland embolism may be the starting point of an abscess if carried to some part of the liver where pyogenic factors already exist. The hepatic vein may also, but more rarely, carry infection.

The *bile ducts* perform a similar office in case of intestinal affections, especially when there is gastro-duodenal catarrh. The presence of foreign substances, as gall stones, giving rise to local necrosis from pressure and to retention and decomposition of bile, greatly facilitates the process. Extension by contiguity of structure is a factor of importance in some cases.

Traumatism in the hepatic region is of less practical importance than would appear at first glance. Extensive injuries to the liver (brakemen in coupling cars, gun-shot wounds) have recovered completely without suppuration.

The *tropical abscess* is a frequent and dangerous disease peculiar to hot climates (India); it shows a special preference for Europeans who indulge in careless and high living. It usually

follows dysentery, but may be idiopathic. Cases of it are not infrequent in our Southern states.

Pathology.—In the great majority of cases seen in the temperate climates numerous small abscesses are found, which upon section prove little pockets of pus directly communicating with the portal vein, and which in reality are distended and suppurating branches of the same. This suppuration involves large portions of the liver, and may include the entire portal system of the liver, save as blocking by thrombi protects parts of it. The hepatic parenchyma is destroyed. Confluence of many small abscesses into one large pus cavity is common; these often contain enormous quantities of pus, even two or three quarts. The pus may be laudable or fetid and bile-stained.

The liver itself is uniformly enlarged; its capsule is tense and smooth; sometimes it is almost normal in appearance; in other cases it shows the underlying numerous abscesses as fine white points.

The large single abscess constitutes a large pus cavity, with indistinct walls made up of necrosed liver tissue, pus cells and amœbæ, kept within check by slowly yielding hyperæmic liver tissue. It contains grayish-white, creamy or reddish-brown pus of peculiar odor. It may involve the greater portion of the liver, and is usually situated near the convexity of the right lobe.

Abscesses may become encapsulated and, if small, even absorbed. The tendency, however, is to perforation. This may take place into the abdominal cavity, followed by diffusive peritonitis, or through the diaphragm into the lungs or bronchi. Or the abscess may empty into the stomach, intestine, pericardium, or pelvis of the right kidney. A frequent and very favorable occurrence is the escape of pus through the abdominal walls after inflammatory adhesion between these and the liver has taken place.

Symptomatology.—The symptoms of suppurative hepatitis lack in characteristic distinctness, and extensive abscesses have often been seen after death when no indication of their presence existed during life. Again, it may be difficult to distinguish and properly classify the symptoms which are local and those which arise from the involvement of neighboring organs.

Small abscesses rarely give rise to symptoms of sufficient intensity to be noticeable.

Enlargement of the liver is common, being situated, usually, near the convexity of the right lobe. "If the abscess occupies the posterior portion of the right lobe, the liver is pushed down so that its margin is perceptible below the free border of the ribs, and the flatness on the right side, posteriorly, extends higher than normal. If the abscess is superficial and is pointing externally, a distinct tumor is felt, and there is almost always more or less bulging of the ribs if the right lobe is affected. Sometimes the organ is enormously enlarged, its free border extending below the umbilicus; the surface of the enlargement is smooth, and it is usually tender on pressure. The sensation to the examiner on making light pressure will be soft and fluctuating, or that of elastic tenseness" (Loomis). Osler emphasizes an "increase in the volume upward and to the right, not downward, as in cancer and other affections producing enlargement." Dullness usually begins at the level of the fourth or fifth rib.

Pain is localized, and generally consists of a dull, heavy, dragging pain across the trunk, which obliges the sick to lie on the right side or on the back, preferably the former. There is often a characteristic pain at the tip of the shoulder or at the angle of the shoulder blade, which is present when the convexity of the liver is involved. Often the pain is superficial; in the presence of a localized peritonitis it is associated with abdominal tenderness and tenseness of the rectus muscle. *Fever* is irregular, intermittent, with occasional chills and copious sweating, especially when sleeping. The temperature may be normal, even sub-normal, then suddenly rise to 102°, or more. It closely resembles malarial fever. *Jaundice* usually is not marked, and occurs in a pronounced form only when there is compression of some large biliary duct; it is seen in about sixteen per cent. of all the cases. Pressure upon the portal vein causes ascites.

The *constitutional* symptoms are: malaise; loss of appetite, nausea, vomiting; progressive loss of flesh and strength; diarrhœa or constipation, irregularity of the bowels being a common feature; increased frequency of the respiration; more or less dry cough; mental depression, nervousness, wakefulness,

stupor, coma, death. A sallow, almost cachectic, appearance of the face is peculiar to the disease.

In case the lung becomes involved from extension, not rupture, through the diaphragm, a pleurisy develops, with reddish-brown expectoration (blood pigment, blood corpuscles, hæmatoidin) containing large numbers of amœbæ coli, such as are found in the liver abscess and stools.

The duration of suppurative hepatitis, as well as its termination, is influenced by the primary cause of the disease. The average case continues from six weeks to two or three months. If due to pyæmia, the course is rapid and toward a fatal termination; in idiopathic cases and in those due to gall-stone, it is very tedious.

The prognosis must always be guarded. A single, small abscess may be absorbed or rendered harmless by calcification, but a large number of small abscesses render a prognosis doubtful, unless they become confluent and thus amenable to operative treatment. Cases due to pyæmia, and with perforation into the peritoneal cavity, are practically hopeless. As a rule, emptying of the abscess externally or into the intestine or bronchi vastly increases the chance of final recovery (about fifty per cent. of all cases), but even here death may occur from complete exhaustion or from some complication, as hæmorrhage, peritonitis or septicæmia. Since operative measures have been introduced into the treatment of hepatic abscess, the percentage of recoveries, according to Fitz, has risen from thirty to eighty per cent.

Diagnosis.—In temperate climates the diagnosis rests largely upon the recognition of primary causes, such as dysentery, and upon the actual demonstration of the presence of pus in the liver. Hence, in all suspected cases an exploratory aspiration is indicated, to be performed with a large aspirator needle, the patient under anæsthesia. The needle should enter in the anterior axillary line in the lowest interspace, or in the seventh interspace in the mid-axillary line, or over the center of the area of dulness behind. The exploration may have to be repeated several times; failure to demonstrate the presence of pus is not conclusive evidence of its non-existence in the liver.

Malarial fever resembles hepatic abscess, but it has pronounced splenic enlargement and is almost sure to be favor-

ably affected by quinine. In doubtful cases the presence of the characteristic micro-organisms will determine the diagnosis. *Hepatic fever of gall-stone* has paroxysms of fever with sweat, which are *regular*, though often separated by long intervals; the paroxysm is followed by increased jaundice; the general condition of the patient is not one of decline, as in hepatic abscess; on the contrary, the intervals between the attacks are marked by excellent health.

Treatment.—The general aim of treatment is to keep the patient in the most favorable condition possible until pus has formed and can be evacuated. If the abscess has emptied itself, further operative measures will be deferred until indicated by a reaccumulation of pus. In case of the large, single abscess this treatment almost always gives prompt relief. When there is pyæmia or suppurative phlebitis, surgical interference, like all other methods of treatment, is absolutely useless. To keep the patient reasonably comfortable, hot or cold applications or sinapisms over the liver, at times dry cupping, have proved advantageous. The bowels should be kept open by appropriate diet and the use of saline waters. Food should be nourishing, but chiefly liquid, such as milk, whey, broths, gruels, beef-juice, and soft toasted bread.

Hepatic abscess is a surgical disease and internal medication, though possibly helpful, is of relatively small importance. Remedies which may prove useful are: BRYONIA, CHELIDONIUM, MERCURIUS SOL., PHOSPHORUS, HEPAR SULPHUR. and HYPOPHOSPHITE OF LIME.

FIBROUS HEPATITIS—CIRRHOSIS OF THE LIVER— CHRONIC INTERSTITIAL HEPATITIS.

A chronic disease of the liver, characterized by an increase in the connective tissue, with gradual destruction of the liver cells, in the course of which process the liver becomes hardened, undergoes a diminution in size, and assumes a granular, hob-nailed appearance.

Ætiology.—Cirrhosis of the liver is a disease of middle-aged men; it rarely occurs in children, except as a feature of syphilitic disease, and only exceptionally in women. The following

are the chief ætiological factors: In more than one-half of all the cases the *abuse of alcoholic liquors*, especially of liquors rich in fusel-oil, as those made from grains and potato (drunkard's liver; gin-drinker's liver); this is said to apply particularly to persons who are in the habit of taking liquors without previously diluting them with water. It is asserted, but without sufficient proof, that the free use of spices, as curry, has a similarly irritating effect upon the liver. *Syphilis* ranks next, especially in the cases found among children. Certain *infectious* (scarlet fever, typhoid fever, tuberculosis, malaria, cholera) and *constitutional* diseases (rickets), presumably by infection of the liver through the blood. Diseases of other organs which give rise to passive venous congestion in the liver, as chronic diseases of the heart and lungs. *Extension*, occasionally, of a chronic perihepatitis into the substance of the liver. *Chronic inflammation of the bile ducts*, from gall stones, tuberculosis, or obstruction or obliteration of the bile ducts from any cause. *Mechanical* irritation, as from the presence of coal dust in the liver, an affection which is occasionally found among miners (anthracosis).

Morbid Anatomy.—The essential feature is the overgrowth of the connective tissue elements, resulting in compression and atrophy of the liver cells, and obstruction of the blood vessels. The size of the liver varies. In some forms extensive hypertrophy exists, and the weight of the liver may reach eight or nine pounds. Others are characterized by extreme atrophy, the weight of the organ perhaps not exceeding one pound; but the overgrowth of connective tissue is always present.

Three forms may be distinguished: the atrophic, the hypertrophic, and fatty cirrhosis.

Atrophic cirrhosis. The liver is much reduced in size; it may weigh as little as a pound or pound and a-half; its substance is hard and tough. The surface is roughened and shows many granulations, varying in size from a poppy-seed to a hazel nut (hob-nailed liver). On section, it appears to be made up of yellow islets, the remains of liver tissue, imbedded in white translucent connective tissue. It is because of this yellow color of the liver that Lænnec called the disease "cirrhosis." In the so-called *Glissonian cirrhosis* the liver is inclosed within a much thickened, sometimes almost cartilaginous, grayish-

white capsule, which can readily be stripped off the hardened atrophied cirrhotic gland, exposing a granulated, at times smooth, surface. The degree of the atrophy differs, as does also the shape of the organ and the extent to which the essential changes have taken place. Sometimes the left lobe almost completely disappears; again the changes may be more pronounced in some parts of the liver than in others; thus, at the sharp edge of the liver there may be nothing left but a semi-transparent tissue, containing none of the elements of the gland. The atrophic form is by far the most common, and usually follows the abuse of alcoholic liquors or, less often, obstruction in the portal circulation.

The *hypertrophic form* is characterized by permanent enlargement of the liver; the number and form of the liver cells is not so materially affected as in atrophic cirrhosis; the organ itself is firm and tough, with smooth surface and, on section, of deep greenish-yellow color.

Fatty cirrhosis presents a smooth surface of the liver; the gland is pale, anæmic, slightly granular, of yellowish-white color. It somewhat resembles fatty liver, but is firm and tough in consistency and presents the characteristic overgrowth of connective tissue. It is said to be a disease of beer-drinkers.

Adhesions may form between the capsule and the peritoneal covering of the diaphragm. The peritonæum is thickened, opaque, and there may be tuberculous peritonitis. Ascites and gastric and intestinal catarrh are common; the spleen is enlarged and dense. Obstruction in the portal circulation, caused by the pressure arising from the excess of connective tissue, necessitates compensatory circulation which is carried on by dilatation of the anastomoses between the portal system of veins and those of the vena cava.

Symptoms.—*Atrophic Cirrhosis.*—The prodromal stage is indistinct. It consists of such symptoms of gastric catarrh, i. e., anorexia, indigestion, nausea, vomiting, etc., as result from the alcoholic habit; among these morning sickness is especially pronounced. There may be pain in the liver, but characteristic symptoms do not arise until there is considerable disturbance in the portal circulation. It is on this account that the establishment of an ample compensatory

circulation is of such vast importance; this being efficiently maintained, there will be slight, if any, constitutional disturbance.

Ascites, arising from stasis in the peritoneal veins, may occur at any time after failure of the compensatory circulation, and may be the first symptom brought to the attention of the physician. It is rather slow in development, but progressive, and is accompanied with corresponding abdominal distension and such difficulty of breathing as results from the upward pressure of the effusion. The amount of the effusion is sometimes enormous, possibly from fifteen to twenty quarts.

Enlargement of the spleen is a constant symptom, though not easy of detection when there is much ascites. It is in proportion to the obstruction in the portal circulation. Palpation more frequently than any other method determines the extent of the splenic enlargement.

Gastric and intestinal catarrh exist throughout the course of the disease, but, unless very pronounced, may not attract much attention, for the patient in nearly every case has for a long time suffered from it as an early result of alcoholism. The bowels are irregular, sometimes constipated, then loose. Often there is active diarrhœa; if so, it should not be suddenly checked, since it constitutes a source of relief to the patient. Chronic venous congestion in the stomach and intestines gives rise to bleeding, and often hæmorrhage from the stomach, sometimes quite copious, appears early in the course of the affection; at other times bleeding occurs from the intestines (preferably the small), or an oozing of blood may take place, and is then shown in bloody coating of the stool. The *liver* is usually somewhat enlarged in the early stage, but later becomes atrophied. Palpation will detect the lower border and its growth in many cases may be watched from week to week until the occurrence of dropsy renders further observation impossible. After the performance of paracentesis a thorough inspection of the liver again becomes possible. If the irregularities on the surface can be detected, recognition of the disease is made comparatively easy. If the liver is contracted, its edges may sometimes be felt in the epigastrium and just behind the costal cartilage.

Constitutional symptoms become pronounced as the case

progresses. Respiration grows labored and somewhat embarrassed from the upward pressure of the peritoneal effusion; the action of the heart from the same cause becomes rapid and feeble. Slight jaundice is frequently present, but is rarely severe, save when the intra-hepatic bile ducts are occluded. There is œdema of the legs, scrotum and other dependent parts, and the patient gradually assumes the appearance peculiar to persons suffering from serious liver trouble. Emaciation is great; the face is pinched and haggard, with cheeks hollow and eyes sunk; the skin is dry, ashen, scaly; the tongue coated and dry. The chest appears flat and hollow, in striking contrast to the distended, protruding abdomen. Throughout there is little, if any, fever, except as fever may arise from some complication. The urine is at first normal; later it becomes dark, scanty and rich in urates, with bile pigment when there is much jaundice. Ecchymoses under the skin or into the mucous membrane, sometimes into the retina, may be seen in the later stage. Exhaustion finally becomes extreme, and death occurs from exhaustion, from some acute complication (pneumonia, pleuritis, peritonitis) or from degeneration of the heart or kidneys.

Hypertrophic cirrhosis is characterized by chronic and great enlargement of liver, with jaundice which may appear suddenly or may have existed for a considerable length of time without creating serious disturbance. All at once the symptoms of an acute febrile jaundice declare themselves, with delirium, dry tongue, rapid pulse, high temperature (102° to 104°), petechiæ, even convulsions, constituting a picture of acute yellow atrophy, death occurring two or three weeks after the onset of these symptoms.

The *course* of the disease is progressive, and the *termination* usually fatal within a year after the symptoms of obstructed portal circulation (hæmorrhage, ascites) have appeared. Nevertheless, even in bad cases marked and lasting relief may follow tapping or the occurrence of a free hæmorrhage.

Diagnosis.—The diagnosis depends upon a history of indulgence in alcohol, presence of gastric catarrh, size of the liver and spleen, occurrence of hæmorrhage from the stomach and bowels, and ascites. *Thrombosis of the portal vein* may exist and is recognized by the rapidity with which ascites develops.

Syphilis is recognized by its history and the evidence of syphilitic disease presented by other organs, as the throat. *Chronic or tubercular peritonitis* have neither jaundice nor splenic enlargement; the face lacks the ashen color peculiar to diseases of the liver; there is more fever, and, in case of tubercular disease, the specific micro-organisms can be found.

Treatment.—If the case is seen early, the use of alcohol in any form, and of spices, coffee, etc., must be positively prohibited. The patient must be kept out of doors, exercising freely and regularly, but stopping short of fatigue; pains must be taken to keep the skin and the kidneys in a healthful condition, being cautious also to protect the patient against getting cold or wet. The diet should be nourishing and easily digested. Milk may be used liberally. Vegetables (with the exception of potatoes), eggs, lean meat, boiled fish and fruits are allowable. Saline waters are very useful at any stage.

If seen in the later stages, the chief task lies in maintaining the strength of the patient and in meeting emergencies as they arise. Such remedies as will favorably affect ascites may be used, but almost always paracentesis must be performed sooner or later. German physicians advise that tapping be done early and repeated when necessary. The use of an elastic abdominal bandage is thought to delay the reaccumulation of the fluid. Hæmorrhage is not often serious, often positively helpful in its secondary results, and practically beyond reach (ice; secale?). When the strength of the patient gives way completely, it may be necessary to use stimulants.

Therapeutics.—To what extent medication may influence the overgrowth of connective tissue which is the cause of the entire train of symptoms is as yet an unanswered question.—*NUX VOMICA*, as shown by reliable and extensive clinical experience, holds a close curative relation to many important results of the alcohol habit, and should prove of value in at least the early stage of cirrhosis. The same applies to *ARSENICUM*, which covers the gastric catarrh and many of the liver and spleen symptoms, to say nothing of its relation to dropsy or its action in cases where malarial influences have been at work. The presence of ascites suggests *APIS*, *APOCYNUM*, *ARSENIC*, *ELATERIUM*, *MERCURY*. *MERCURY*, *BRYONIA*, *CHELIDONIUM*, *CARDUUS*, *NITRO-MURIATIC ACID* and *PODOPHYLLUM* may

be indicated, especially in the early stage. POTASSIUM IODIDE and MERCURY are suggested by the presence of syphilitic symptoms.

FATTY LIVER.

The normal liver contains considerable fat, nearly four per cent. of its weight. Under certain circumstances, as after eating freely of rich, fat food, a temporary increase of fat in the liver takes place, which may become excessive when such indulgence is habitual and occurs in persons who shun physical exertion; this is *fatty infiltration*, a process which in itself is not pathological, although, it may give rise to inconvenience and even disturbance of health.

Under certain circumstances, however, the cell-protoplasm of the liver is destroyed and fat takes its place; this is a pathological, degenerative process, known as *fatty degeneration*.

Ætiology.—As stated, fatty liver may be the result of habitual high living or of gluttony combined with physical laziness. An abnormally large amount of rich food is taken into the system, carried to the liver, and is there left to accumulate. The liver is not at fault.

Chronic wasting diseases, like phthisis and extreme anæmia, give rise to fatty liver, presumably because of resulting failure to complete the process of blood oxidation. The same cause, i. e., deficient oxidation, is operative in chronic alcoholism, in some cases of chronic diarrhœa, rickets and malaria. Phosphorus-poisoning also causes fatty degeneration of the liver.

Pathology.—The liver becomes uniformly enlarged, sometimes attaining great size, with smooth surface and round borders. It is pale, bloodless, doughy, and pits on pressure. On section it is dry; put upon a piece of blotting paper, it leaves a grease-spot; fat is left upon the knife used in cutting it. When thrown into water, the liver floats.

The microscope shows that in light cases the fat globules are limited to the outer zone of the lobules near the portal vessels; in more extensive cases the entire organ is involved.

Symptoms.—The symptoms are not characteristic. Physical examination will determine the degree of enlargement of the liver, provided the subject is not obese; in case of emaciation

from wasting disease the enlargement is readily recognized. There is no pain or jaundice. Exceptionally the portal circulation is somewhat interfered with, and then gastric catarrh is present. Sometimes the patient is troubled with hæmorrhoids. Very fat people may suffer a good deal from respiratory embarrassment and palpitation of the heart, especially upon exertion, etc., but these symptoms are not the result of the hepatic disorder. When fatty liver is associated with a profound constitutional disease, the symptoms of such affection are, of course, present.

The diagnosis depends upon the existence of such habits or disease as in themselves suggest the possibility of fatty liver and upon the negative character of the hepatic symptoms (as: absence of pain, hardness, jaundice, splenic enlargement, etc.). Addison considered a bloodless, waxy appearance of the skin, which to the touch gives the impression of smoothness and laxity, characteristic of fatty liver.

Treatment.—A life of activity in the fresh, open air; moderation in eating and drinking; a diet limited to a reasonable amount of good, wholesome food, avoiding fats, sugar and starch; living in cool rooms; abstinence from alcoholic drinks, ale, beer, and champagne; free use of the cold sponge or plunge bath—these constitute the treatment of cases arising from high living and obesity. When a feature of wasting disease, the treatment must be that of the fundamental disease.

Of remedies, PHOSPHORUS, theoretically, promises most; Bayes claims to have had good results from it.—ARSENIC and IODOFORM should also be of service, since they in the provers cause symptoms of fatty degeneration. There is, however, no reliable clinical evidence to sustain any claim made in their behalf.

AMYLOID LIVER.

Amyloid, waxy, lardaceous liver occurs in connection with chronic suppurative processes and low, cachectic states, as scrofulous, tuberculous and syphilitic diseases, especially of the bones and joints. Its essential causes are not known.

Anatomy.—The liver is much enlarged, even to twice its normal size, and is hard, inelastic, resistant, with smooth and glistening capsule. It cuts like bacon (“lardaceous” liver).

When cut, the organ appears of grayish or yellowish color, "waxy," a little blood often exuding from the cut surface. A thin slice of liver, held up to the light, transmits the light. The application of a solution of iodine changes the color of the surface to a brownish red, mahogany color. Evidence of co-existing cirrhotic, fatty or syphilitic disease is frequently found. The spleen and kidneys are often implicated.

Symptoms.—The large, resistant and smooth hepatic tumor can be made out by palpation. There is no tenderness to pressure, no pain in the liver, no jaundice. If the enlargement is great, abdominal fulness and distension are felt, and the patient may suffer somewhat from symptoms of gastric catarrh. Enlargement of the spleen may be detected by palpation in the left hypochondrium. Dropsy, beginning in the legs and extending into the serous cavities, is the expression of renal involvement and of profound cachexia. The stools often are clay-colored and frequent. There is no fever.

The diagnosis depends upon the painless enlargement of the liver, occurring in connection with the morbid states enumerated, with renal and splenic complications.

The duration is indefinite, from months to years; the prognosis is unfavorable.

Treatment consists of measures directed to the primary disease and of such regimen as will best maintain the strength of the patient. A life in the open air, good nourishing diet, clothing which will insure an even bodily temperature and prevent taking cold, a healthful condition of the skin, and caution in the use of alcohol, constitute nearly all that can be done. Iodine in some form appears to exert a favorable effect upon the process; the potassium iodide will prove particularly useful when there is syphilitic taint. Mineral waters containing iodine should be persistently drunk (Kreutznach, Woodhall Spa, etc.). Thermal baths are also highly recommended (the hot baths of California, Colorado, New Mexico, Virginia, Arkansas, etc.; in Europe, Aix-la-Chapelle, Ems, etc.).

MORBID GROWTHS.

Malignant disease of the liver consists of cancerous or sarcomatous growths, with enlargement of the organ, irregularity

of its surface, usually severe pain, cachexia, etc., and in the greater number of cases, rapidly fatal termination.

Cancer of the liver is a disease of middle age (from 40 to 60 years of age) and occurs oftener in men than in women, although the frequency with which secondary cancer is seen in the liver of women suffering from cancer of the uterus must not be overlooked. Heredity is an important factor.

Primary cancer occurs in about one-fourth of all the cases. It may be *massive*, appearing in large masses involving a considerable portion of the liver, as a grayish-white formation, rather hard and distinctly outlined. The *nodular* form consists of nodules irregularly scattered throughout the organ, with usually a primary or parent formation, easily recognized, from which the secondary nodules have sprung. In another and rare form *cirrhosis* of the liver is present; the surface of the gland is yellowish-gray and studded with nodular, yellowish masses, surrounded by fibrous tissue, which upon section are seen in abundance throughout the organ.

Secondary cancer is usually found in masses which may reach immense proportions and give rise to great enlargement of the liver, the organ weighing twenty pounds, or more. When near the surface of the liver the cancer-nodules give to it an easily detected irregularity of surface. The nodules are usually flattened and have a central depression ("cancer navel"); they may be disseminated equally throughout the liver or may involve only one lobe. Their appearance on section is grayish-white or reddish-white, or dark red if there has been much extravasation of blood. Extensive degenerative changes may take place. Fatty degeneration is comparatively frequent; hyaline transformation may occur; it changes large areas into a dry, dense, grayish-yellow mass. Hæmorrhage and suppurative processes are common.

The *bile passages* are subject to cancerous disease, usually the result of irritation from the presence of calculi, which first attack the fundus of the gall-bladder, then the common hepatic ducts and contiguous structures.

While true cancer is by far the most common form of malignant growths seen in the liver, *sarcoma* is found occasionally, especially melanotic sarcoma. This is almost always secondary to sarcoma of the skin or eye. The liver is enlarged,

and upon section presents a dark, more or less uniformly mottled appearance, like dark granite or marble. *Angioma* are comparatively frequent; they consist of small reddish bodies, not often exceeding the size of a walnut, made up of dilated vessels.

Symptoms.—Until far enough advanced to occasion considerable enlargement, no symptoms may be present; in fact, to a certain extent the presence of symptoms depends upon the size of the cancerous growth. In some cases, however, moderate gastric uneasiness, loss of appetite, nausea and vomiting, with lassitude and loss of flesh and a tendency to constipation, are made the subject of complaint. *Pain* may, or may not, be felt; if present, it varies in intensity and, when severe, radiates from the liver in different directions. *Jaundice* is seen in about one-half of all the cases, with or without colored stool; it is rarely marked unless there is occlusion of the common bile duct. *Ascites* is infrequent, except in the cirrhotic form; pressure upon the portal vein or peritoneal involvement causes dropsy. *Fever* is slight. In many cases there is practically no elevation of temperature, while in others a continuous elevation, reaching 101° or 102° , may exist. Pus-formation naturally causes a rise in the temperature. The *urine* is scanty, high-colored, slightly albuminous. In melanotic sarcoma it is dark, blackish, from the presence of melanin; or it may assume this color after standing or when heated with nitric acid, from the presence of melanogen.

Inspection shows an enlargement of the liver which in exceptional cases may extend below the ileac crest. This enlargement is progressive and its development can be watched. Superficial, distended veins are often seen. Frequently the nodular masses may be plainly felt through the abdominal wall and even the umbilicated depressions in the individual nodules may be made out. If the left lobe is involved, the aortic impulse is transmitted, differing from the impulse of an aortic aneurism chiefly in that it is less expansile. The spleen is rarely enlarged.

As the case progresses, cachexia becomes pronounced. There may be considerable annoying itching of the skin. Later, bleeding may take place from the skin, nose, stomach and bowels. If the latter (Frerich), there is usually intense jaun-

dice with somnolence and delirium. The face assumes a sallow, earth-colored complexion; emaciation and exhaustion become extreme; and the patient dies of complete breaking-up of the whole system, during which, in the secondary form, the symptoms of the primary disease strongly assert themselves.

Diagnosis.—In the early stage it is almost impossible to recognize the affection, and a careful examination into the antecedents of the case is important. *Waxy liver* has both increase in size and cachexia, but the enlargement is smooth, uniform, painless, slow of growth; there is splenic enlargement, albuminous urine, often a history of syphilis; or there may be tedious suppurations, especially of the bone, in some part of the body. *Fatty liver* is easily recognized by the absence of symptoms of hepatic disease, save enlargement, and by its close relationship to alcoholism, consumption, etc. *Syphilitic liver* may closely resemble malignant disease, but evidence of syphilitic disease can usually be obtained in the age and history of the patient and in the presence of syphilitic cicatrizations in the throat. Additionally, jaundice and dropsy are hardly ever present; there is rarely tenderness in the hepatic region; the nodules are smaller and softer to the feel, and the spleen is often greatly enlarged. *Dilatation of the gall-bladder* gives rise to a large tumor at the lower margin of the liver, but this is usually rounded or pear-shaped; there is also intense jaundice, no ascites, often a history of colic, and the paroxysms of pain precede, not follow, the other marked symptoms. *Cancer of the gall-bladder* can only be distinguished from cancer of the liver in those rare cases where the form and location of the tumor distinctly prove its identity. *Gall-stones* exceptionally resemble hard cancerous nodulated swellings, but the tumor is movable and lacks the element of continuous growth; there is a history of gall-stone colic and often a sensation of weight rolling from side to side as the patient turns in bed. Severe constitutional symptoms, as cachexia, are wanting. *Cancer of the stomach* has severer gastric symptoms, as vomiting and pain radiating from the stomach; the enlargement rarely involves the hypochondrium, and never completely; the tumor differs in outline. When the left lobe of the liver is the seat of cancer, differentiation may be practically impossible, save as the hepatic symptoms may

throw light upon the case. *Cancer of the omentum* cannot be differentiated when the lesser omentum is involved or when a loop of the intestine thrust across the enlarged liver gives to it the appearance as if the tumor were to the left of and below the stomach, as though omental. Usually the boundaries of the tumor, the entire absence of jaundice, and the normal condition of the stools clear up any existing doubt. *Hydatid* tumor of the liver has more or less fluctuation, often quite distinct; no pain; no serious functional or constitutional disturbances.

The *course* of the disease tends progressively toward a fatal termination, which usually takes place within a year, often much sooner, from the time the disease was first recognized. Death occurs from exhaustion or from some incidental complication, as cancerous peritonitis or hæmorrhage.

Treatment is purely palliative and sustaining. Remedies like ARSENIC, AURUM, CONIUM, HYDRASTIS, such as are employed in treating cancer in any other part of the body, may be tried here; if not capable of curing, they may prolong life and render it less burdensome. Burnett claims to have cured cancer of the liver, in two instances, by CHOLESTERINE, 3x.

Hydatids of the liver will be considered later (see Echinococcus Disease).

Simple cysts are rare. If single, they are large; if multiple, they are small and scattered throughout the liver. They consist of a fibrous wall, lined with pavement epithelium, and contain a clear fluid. The cysts are not connected with bile ducts or vessels.

Erectile tumors are found at the anterior margin of the liver or on the upper surface near the attachment of the suspensory ligament. They are of the size of a hazel-nut, red or bluish-red, roundish, inclosed in a capsule of delicate connective tissue, and contain fluid blood or soft coagula. They rarely project beyond the surface of the organ.

Lymphatic formations are associated with leukæmia. They consist of small patches of soft tissue, made up of an aggregation of lymphoid cells which are held in meshes of a delicate reticulum. Frerichs thinks they are developed from the walls of small vessels.

Tubercles of the liver are associated with acute general

tuberculosis; they are miliary, and are found throughout the liver, especially on the surface (see article on Tuberculosis).

Benign growths occur occasionally, but yield no clinical signs.

MALFORMATION AND MALPOSITION.

Of congenital malformations of the liver, the lobulated liver of congenital syphilis is the most important. The so-called "corset" liver or "lacing" liver—an acquired malformation—is the result of continuously applied severe pressure upon the organ, in women resulting from the use of tightly laced corsets or waistbands, in men usually from wearing tight belts. The deformity consists of a division of the liver into two unequal portions by a deep transverse groove or furrow extending the entire width of the organ. The peritoneal covering or coating of this groove may have become fibroid. The smaller, compressed portion of the liver is atrophied, dense, fibrinous, and is held to the lower portion by a compressed, atrophied, band-like structure. The lower and larger portion of the right lobe may be freely movable upon the smaller, as though hung upon hinges. As seen in practice, no marked symptoms result, but the probable eventual occurrence of jaundice or calculi is evident. Removal of the pressure, if not too long deferred, with rest on the back or side, and the application of heat, may restore the parts to their normal shape. Abscesses, cicatrizations and chronic inflammations affect and alter in varying degree the shape of the liver.

"*Movable*" liver is due to the relaxation of ligamentous support (suspensory and triangular ligaments) of the organ, allowing the liver to drop down, even entirely below the costal margin, as soon as the erect position is assumed. The condition is very rare. The liver may be transposed, the right lobe occupying the position of the left; or it may tilt forward, so that "the long axis is vertical, not transverse. Instead of the edge of the right lobe presenting, just below the costal margin, a considerable portion of the surface of the lobe is in contact with the abdominal parietes, and the edge may be felt as low, perhaps, as the navel. This anteversion is apt to be mistaken for enlargement of the organ" (Osler).

DISEASES OF THE GALL-DUCTS AND GALL-BLADDER.

CATARRHAL JAUNDICE.

Jaundice is a symptom, consisting of a yellow discoloration of the skin and many of the tissues and fluids of the body. It results from the absorption of bile through the lymphatics of the liver when the outflow of bile has become obstructed. In the present case this obstruction is due to a catarrhal condition of the terminal portion of the common duct, with thickening of the mucous membrane and occlusion of the duct by a plug of inspissated mucus.

The catarrhal involvement of the affected portion of the common duct is in the larger number of instances due to the *extension* to these parts of a gastro-duodenitis, such as oftenest arises from an error in diet, or from cold or exposure, or as may exist in connection with chronic disease of the heart, Bright's disease, portal obstruction and malaria. In certain *infectious fevers*, as typhoid fever and pneumonia, catarrhal jaundice is common, and on occasions there have been epidemics of it, in nearly every case as a sequel or concomitant of influenza. A passing, but intense, jaundice may result from *violent emotion*. The writer at one time, with several other medical men, happened to witness the almost instantaneous development of an intense jaundice as the result of violent anger. Whether, or not, epidemic and emotional jaundice can be properly placed here is an open question.

Symptoms—The most striking symptom is the *yellow color* of the skin with which all are familiar. A yellow tinting of the eye ball is usually noticed first; the forehead then assumes a light yellow color, and gradually the entire body is tinted. The color varies from a light, scarcely perceptible yellow to intense shades of the same hue, deepening into a dark mahogany; in the true catarrhal jaundice, however, the intense deep coloring is never found. It may be said that the coloring of the skin gets darker the more complete the obstruction and the longer the duration of the affection. The *mucous mem-*

brane is somewhat jaundiced, as may be seen in the appearance of the hard and soft palate. The *urine* contains bile and *foams* when shaken in a glass. A very satisfactory and easily performed test for bile is made by pouring nitric acid into a test-tube, adding to it one or two drops of fuming nitric acid. A few drops of urine are allowed to flow from a pipette upon the side of the glass. An iridescence of green, violet and red shows at the point of contact. The *fæces* become light-colored and of soft consistency, like soft clay or putty. The light color is due to the absence of bile in the stool; the soft consistency of the stool arises from the presence of undigested or partially decomposed fat. The *pulse* may be normal, oftener slow, averaging about forty beats to the minute; this is presumably from the action of the bile salts upon the ganglia of the heart. *Itching of the skin* without any external manifestation of irritation is an annoying symptom in more than half the cases; its favorite seat is the palm of the hand or the sole of the foot; it is especially troublesome at night, rendering the patient restless and unable to sleep. *Intestinal flatulence* is common; it is sometimes associated with colic and constipation. There is also gastric uneasiness, with loss of appetite, nausea, emptiness and goneness at the stomach before eating, and a sense of great fulness after eating. Dull headache, indifference, mental depression and irritability are usually present. The liver generally is slightly enlarged, with corresponding increase in the area of dulness.

In some cases the icteric appearance of the eyes is the first symptom noticed; in others, loss of appetite and indigestion, with more or less aching in the back and legs and soreness in the region of the liver gradually lead up to the jaundice; when gastro-duodenal catarrh is pronounced, dyspepsia may exist for a week, or more, before the jaundice sets in.

In the *epidemic* form the onset is sudden and the symptoms severe; vomiting may be quite violent; there is headache, frequently a chill, followed by moderate fever with a temperature of 101° or 102° .

When the attack is light, recovery takes place within a week, or two; occasionally, however, the case drags along for a month, or two, and even longer. The reappearance of bile in the stools, with the return of natural color of the *fæces*, is always a sign that recovery is taking place.

The diagnosis depends upon the appearance of jaundice in persons of previously good health, quickly followed by the characteristic signs, without great enlargement of the liver or the occurrence of ascites, fever, or profound nervous symptoms. If the case is very prolonged, the negative results of a carefully conducted physical examination and the absence of severe pain and pronounced cachexia establish the diagnosis.

Treatment.—The patient must be kept out-of-doors and be made to exercise freely and systematically. The diet should be light, consisting chiefly of milk, vegetables and tart fruit, to the exclusion of starch, sugar and fat. Milk usually is well borne, and may be taken skimmed, with equal parts of Vichy or Apollinaris water. Buttermilk generally is relished and meets the demands of the case. The chief aim to be secured is to avoid “intestinal putricity”; hence, in addition to proper diet, the exhibition of inspissated ox-gall, in doses varying from 2 to 10 grains at meal time, has been highly recommended and to some extent appears to supply the existing deficiency of bile. The kidneys and bowels should be kept active, but cathartics must be avoided; an occasional dessert-spoonful of olive oil answers the purpose. One of the most distressing symptoms in some cases is intense pruritus. Some relief from it may be had by the use of hot drinks (hot sage tea) or any other means which excite sweating (pilocarpine, $\frac{1}{12}$ grain, hypodermically). Massage, vapor baths, or sponging with a solution of 10 to 20 drops of carbolic acid in a pint of water, are each useful. Mercurial washes are advised, but are not without danger.

Various means of promoting the expulsion of the mucous plug have been suggested; of these, the most practical are the faradic current (one pole stationary over the region of the gall-bladder, the other on the back, at a point opposite the gall-bladder, to be moved gently to and fro) and the injection of cold water into the rectum, one or two quarts every morning before breakfast; it is claimed that the injection of cold water, by reflex action, excites contraction of the gall-bladder and favors the expulsion of the plug.

Therapeutics.—ACONITE, in the acute form; from getting wet or cold, especially in children.—ARSENIC, when there is marked gastro-duodenal catarrh; malaria; typhoid fever.—

AURUM. In connection with fatty liver.—BERBERIS. Shooting pains in the region of the liver. Morbid hunger alternating with loathing of food, or great thirst with aversion to drinking; symptoms of gastric catarrh, with heartburn and vomiting of food.—BRYONIA. An excellent remedy when there is gastric catarrh, with swelling and soreness of the liver, sharp stitching pains in the liver, with aggravation from motion; thirst; heavy, whitish-yellow coating of the tongue. Said to act well after the abuse of calomel or when the attack is brought on by a fit of anger. Patient appears hot, but complains of feeling cold.—CARDUUS MARIANUS. Dull headache; bitter taste in the mouth; tongue white and foul; fulness in the region of the liver.—CHELIDONIUM. Pain over the region of the liver; pain under the right scapula; intense itching of the skin.—CHINA. Liver swollen and sensitive to touch; feeling in the right hypochondrium as of ulceration beneath the skin. Gastro-duodenal catarrh; tongue yellow; oppressive headache at night; loathing of food, yet canine hunger. Abdominal distension, with constant desire to belch up gas, without relief; fermentation in the bowels. Diarrhœa of light, clayish, whitish stools, with emission of fetid flatus. From malarial influences, with painful enlargement of the spleen. Jaundice of nursing children, with tympanitic abdomen and enlarged liver and spleen.—DIGITALIS. In cases arising from chronic disease of the heart. Enlargement and soreness of the liver, as though bruised. Tongue clean or whitish-yellow; bitter or sweetish taste; vomiting; stools ash-colored, white; urine high-colored. Action of the heart very slow, sometimes intermittent.—HYDRASTIS. Gastro-duodenal catarrh; sinking, faintness, gone-ness at the pit of the stomach. Tenderness in the hepatic region; stools light-colored.—IODINE. Jaundice of cirrhotic liver; after abuse of mercury; splenic enlargement; great emaciation; thick coating of the tongue; great thirst; canine hunger, with vomiting after eating; diarrhœa of whitish stools alternating with constipation.—MERCURY. Duodenal catarrh. Flabby, thickly coated tongue, showing the indentations of the teeth. Foul odor from the mouth. Great hepatic soreness, worse from lying on the right side; severe pains in the liver, worse at night and when lying on the right side. Jaundice of new-born children. After the

abuse of quinine.—MYRICA. "Dull, heavy headache in the morning; yellow color of the sclerotic and face; tongue yellow; very heavy and drowsy; general soreness and aching in the muscles; slow pulse; dark, turbid urine" (T. F. Allen). Great despondency.—NUX VOMICA.—Gastro-duodenal catarrh, especially of drunkards, with characteristic symptoms. Liver swollen, hard, sensitive to pressure. From anger. Faintness, followed by great weakness. Wakes about 3 or 4 A. M., then falls into a heavy, unrefreshing sleep. Itching of the skin in the evening. Impatient, irritable mood.—PHOSPHORUS. Jaundice depending upon profound anæmia or organic disease of the liver. Malignant jaundice with sleepiness.—PODOPHYLLUM. Marked irritation in the duodenum, with fulness and pain in the liver and throughout the hepatic region, with intestinal and gastric "acid" indigestion.

CHOLELITHIASIS—GALL-STONES.

Gall-stones are formed within the liver ducts and are the result of precipitation of certain soluble or slightly soluble substances which under normal conditions are held in solution by the bile. They are composed largely of cholesterine (from 70 to 80 per cent.), with the addition of coloring matter, bile acids, fatty acids and lime salts. The number of stones present in a case varies greatly. Sometimes there is but one calculus; if so, the stone is ovoid and large. Oftener there are a number of stones, from 5 to 10, or more; sometimes there are hundreds and even thousands. The greater the number, the smaller the size. The shape usually is polyhedral, with rounded edges and numerous facets; the surface is roughened by erosion or smooth and greasy to the "feel." In color they vary from grayish-white to an almost black; usually they are dark-brown, of the color of bile pigment. Their consistency is soft, so they crumble easily from slight pressure of the fingers; when composed largely of lime, they are very hard. In the liver they are seen as large granular masses or in deposits which fill the ducts, looking like dark, shiny slate pencils. Structurally they are composed of a nucleus, body, and shell. The nucleus consists of lime and coloring matter or hardened mucus; sometimes it is a parasite, rarely some foreign body (needle, fruit-stone). The

body is made up of cholesterine and coloring matter, amorphous or homogeneous, fracturing like soap. The outer shell or crust is composed of smooth, horizontal layers of cholesterine.

Calculi entirely composed of some one substance are rare. Those of pure cholesterine are very light, smooth, colorless or of grass-green hue, and not often larger than a cherry. Pure pigment stones are small and numerous, often of mulberry-shape, occasionally contain copper, and are homogeneous throughout. Calculi of pure lime are very rare, usually single, hard, heavy, of whitish-gray color and uneven on the surface.

Ætiology.—Stone in the gall-bladder may occur at any age, but is more frequent in the decline of life. Women, especially those who have borne children, suffer from it oftener than men. Sedentary habits, with generous living, is held to be an important predisposing factor. Any interference with the outflow of bile, as from tight lacing, may give rise to gall-stones. Of the various theories advanced concerning their immediate cause, that of precipitation of cholesterine from a catarrhal condition of the gall bladder is considered the most rational.

Symptoms.—Gall-stones may exist for an indefinite period without causing disturbance, and, if quite small, may pass through the common bile duct and out of the system without attracting attention. When a stone of any size passes through the ducts, it gives rise to a train of symptoms which are called "*Biliary colic.*" This is characterized by intense pain, usually appearing two or three hours after eating. It is a radiating pain in the right hypochondrium, extending into the shoulder and into the right scapula, sometimes into the epigastric region, lower chest or arm. Its severity renders it almost unendurable and forces from the patient manifestations of extreme suffering. It is often accompanied with a chill, followed by fever with a temperature of 102° to 103°. In other cases there is slight, if any, fever, but there is vomiting, copious sweating and low pulse.

The *liver* is frequently enlarged and may be felt below the edge of the ribs; it is tender and sensitive to pressure, especially in the region of the gall-bladder, which may be enlarged and appear like a pear-shaped mass. *Jaundice* is noted in about half the cases, its intensity depending upon the degree of obstruction. It never appears at the beginning of an attack.

When there is occlusion of the common duct it develops rapidly and may be complete in twelve hours.

The duration of an attack varies from a few hours to days, and even weeks, the pain ceasing when the stone comes to rest, and recurring as soon as it again begins to move. Having passed into the duodenum, or possibly having dropped back into the gall-bladder, relief is at once experienced.

The severity of the pain is such that fainting and serious disturbance of the heart's action is not uncommon, and in very nervous persons even convulsions may occur. Rupture of the duct, with resulting fatal peritonitis, is among the possibilities.

Diagnosis of Biliary Colic.—The chief diagnostic points are: age and sex; intensity of the pain; locality (right hypochondriac and upper abdominal region); history of previous attacks; jaundice. The detection of gall-stones is, of course, highly important; to accomplish this, the stools must be thoroughly mixed with water and then carefully passed through a fine sieve. *Colic* from other causes may resemble biliary colic, but the above points almost always render the differentiation easy. *Gastralgia* is a disease of younger people; there are symptoms expressive of a neurosis; the pain is in the epigastric region; the intervals between the paroxysms are much shorter. *Ulcer of the stomach* has intense pain, but it is rather circumscribed, is more continuous, is usually brought on by eating, and there is hyperacidity of the gastric juice. *Lead-colic* has a history of lead-poisoning; there is no jaundice; blue lines along the gums are generally seen; the breath is very fetid; serious nervous disorders, such as palsy, encephalopathies, etc., are present.

Certain changes result from *chronic obstruction of the ducts by gall-stones*. If the obstruction is in the *cystic duct*, the gall-bladder is liable to suffer severely. *Dilatation* of the gall-bladder (*hydrops vesicæ felleæ*) may occur, resulting in a gourd-like and often enormous enlargement of the viscus, projecting downward toward the middle line, often as low as the navel, and easily recognized. Even when the enlargement is moderate it can usually be made out below the edge of the liver. The contents of the tumor consist of a thin mucoid fluid, at first tinged with bile; later all traces of bile disappear, and the fluid becomes clear, of alkaline reaction or neutral. *Sup-*

purative cholecystitis (empyema of the gall-bladder) is rare, save as it occurs in connection with cholelithiasis. The dilatation is great, and pus may be found in very large quantities. The tendency is to perforation and abscess-formation. *Atrophy* of the gall-bladder often follows hydrops. The bladder contracts firmly upon the calculus, forming a closely fitting envelope. Sometimes it appears as a small fibrous mass no larger than a hazelnut, and even as a tough fibrous string. *Calcification* may follow empyema, and consists of a true infiltration of the walls of the cyst with lime (ossification) or of an incrustation of the mucous membrane with salts of lime. *Acute phlegmonous cystitis* and diverticula are rare.

Obstruction of the common duct may cause dilatation and catarrhal or suppurative inflammation of the bile ducts (cholangitis). The former is characterized by chill, fever and sweat, like ague, and jaundice which increases with every paroxysm; this condition may continue for years. The paroxysms are sharp; the chill is severe and the temperature may reach 104° and 105°. In some cases there is pain and gastric irritation (nausea and vomiting); general health declines. The liver is usually moderately enlarged. *Suppurative cholangitis* has fever of a remittent, sometimes intermittent, type, with brief apyrexia and moderate jaundice; the latter lacks the aggravations of the catarrhal form. The liver is enlarged and tender, and signs of septicæmia are present. The suppurative process may involve the ducts throughout the liver and also the gall-bladder; or it may extend beyond, resulting in localized abscess of the liver, or it may perforate the gall-bladder and form an abscess between the liver and stomach. The affection proceeds rapidly toward a fatal termination.

The *remote effects of gall-stone* are important. The stones must either remain in the gall-bladder, or stay fixed in the ducts—causing occlusion—or they must find their way out. The first is often the case. The effects of occlusion have been considered. If the escape of the stone has not been accomplished during biliary colic, nature may attempt to secure the same end by ulceration and the formation of a *biliary fistula*. These fistulæ usually open into the intestinal canal, preferably into the duodenum, either from the common duct or the gall-bladder; less often into the jejunum or ileum, and rarely into

the colon. Fistulous openings into the stomach are rare. Gall-stones have also been discharged into the bladder, the pelvis of the kidney, through the abdominal wall, or into the peritoneal cavity, in which case the escape of the stone is followed occasionally by the contents of the gall-bladder, resulting in fatal peritonitis; fistulous openings are sometimes found into the portal vein or into some cavity in the liver. In some cases a very large number of gall-stones may be discharged *en masse* into the intestinal canal, and may there give rise to obstruction, especially in the ileum. Of 295 cases of obstruction of the bowels, covering a period of eight years, analyzed by Fitz, twenty-three were caused by gall-stones.

Treatment.—The treatment of an attack of biliary colic consists almost wholly of measures to subdue pain. The administration of remedies indicated by the totality of symptoms is useless so far as prompt relief from intense suffering is concerned.

Moist heat, in the form of flannels wrung out of boiling water, applied to the upper abdomen and covered with dry cloths, with drinks of hot water and a hot bath, should be administered at once. If necessary, morphia ($\frac{1}{4}$ grain) and atropia ($\frac{1}{120}$ of a grain) may be given hypodermically, and repeated in lighter doses as necessary, taking especial pains not to overstep the limitations of prudence. Chlorodyne, in 15-drop doses, is often useful. Chloroform has proved very comforting when used intelligently. From 15 to 20 drops should be administered by means of a napkin or handkerchief during the paroxysm, never allowing the patient to become unconscious.

The paroxysm having ceased, measures must be adopted to prevent the continued formation of gall-stones and, if possible, to insure the expulsion of any still present. To accomplish the former, the patient should be encouraged to exercise freely and regularly in the open air; horse-back riding is especially useful. The diet should be light and nourishing, excluding starch and sugar. The free use of alkaline mineral waters, as Carlsbad, is highly recommended. Or a teaspoonful of Carlsbad salts, dissolved in hot water, may be drunk just before breakfast, taking two or three smaller doses, from 10 to 15 grains, during the day. These act upon the bile, preventing its concentration, and thus lessen the tendency to the formation of gall-stones.

The olive oil treatment has warm friends and bitter opponents. Eminent clinicians have indorsed and condemned it, but the weight of evidence is in its favor. A small teacupful of olive oil should be taken in the evening, repeated two or three times, on successive days. Glycerine is highly extolled by the French school, and for the abortion of an attack is exhibited in doses of five drachms to an ounce, repeated for several days, if necessary. During the attacks it may be given every morning in doses of from one to three teaspoonfuls in half a glass of some alkaline water.

All attempts to find chemical solvents to act upon the gall-stone within the body have proved futile. The proposed expression of the calculus from the gall bladder by digital manipulation is both useless and dangerous.

Exploratory puncture has been practised in extensive distension from occlusion of the cystic duct. When all other means have failed, and the condition of the patient demands heroic measures, the case may have to be referred to the surgeon for such relief as the operations of cholecystotomy or cholecystectomy may offer.

Remedies recommended for the treatment of the acute paroxysms of biliary colic are NUX VOMICA, BELLADONNA, CHINA, CHELIDONIUM and BERBERIS.

In the treatment of the diathesis itself CHELIDONIUM has made a good record. The testimony of Rademacher, who first recommended it, has been verified by many others. The remedy should be given in light doses of the mother tincture, made from the fresh plant, three or four times daily.—Burnett speaks highly of THLASPI. He attributes to it the power of dissolving the calculi, probably by promoting the free secretion of thin bile. I have had no experience with it.—CHINA has long been a favorite remedy with many. The late Dr. David Thayer attributed to it great efficacy, maintaining that it cured every case of gall-stone colic when taken in the 6th attenuation, twice daily, for some length of time.—EUONYMIN, three or four doses daily of the 1x trituration, is recommended by Hale when there is stupid (occipital) headache, the urine being loaded with uric acid.—CALCAREA CARBONICA, when its constitutional indications are present, has yielded good results and, according to Hughes, even controls the acute colic so as to render chloroform unnecessary.

It seems evident that permanent relief is most likely to come from remedies which increase the flow of thin bile; to these belong *PODOPHYLLUM*, *IRIS*, *JUGLANS*, *HYDRASTIS*, *BERBERIS*. These, and others mentioned under "Jaundice," should be carefully studied.

MISCELLANEOUS AFFECTIONS OF THE BILE DUCTS.

Cancer of the gall-ducts cannot be positively recognized during life. It is characterized by rapidly progressing jaundice, with complete absence of bile from the intestine, and without attacks of biliary colic. It causes stenosis and dilatation of the common duct, and, according to Naunyn, is present in about half the cases of chronic jaundice. It is fatal, from cholemia, in the course of three or four months.

Cancer of the gall-bladder is usually secondary. It often starts near the fundus or cystic duct and gradually involves the wall of the entire bladder, which becomes thickened and hardened from the cancerous infiltration, with considerable enlargement of the bladder, varying from the size of a fist to a child's head. Extension into the liver or the capsule of Glisson is common. The symptoms closely resemble those of cholelithiasis, with jaundice in the late stage and strongly marked cancerous cachexia. It is rare among young persons. The diagnosis is difficult, for it closely resembles cancer of the pylorus and cancer of the liver. An appreciable enlargement of the gall-bladder is essential to the diagnosis. The course is rapid and the termination fatal.

In very many cases of primary cancer of the duct and gall-bladder there is a history of gall-stone; hence the relative frequency of the affection in persons beyond middle life and the preference for women. Musser collected 118 cases, of which the gall-bladder was affected in 100, the ducts in 18, cases.

Obstruction is usually the result of pressure from without, as from cancer of the pancreas or pylorus, involvement of the lymph glands of the liver, pressure from abdominal tumors or, rarely, from aneurism of the aorta or of some branch of the cœliac axis. Foreign bodies, round worms, liver flukes, echinococci and gall-stones cause obstruction by pressure from within.

Complete occlusion or stenosis results when the size of the obstructing body is sufficient to completely fill the duct or as the result of ulceration and cicatrization. The symptoms are those of chronic obstructive jaundice, with primary enlargement and secondary atrophy of the liver, often accompanied with hepatic intermittent fever, especially in case of occlusion from gall-stones. Permanent occlusion is necessarily fatal.

DISEASES OF THE BLOOD-VESSELS OF THE LIVER.

Anæmia occurs in connection with fatty or amyloid disease of the liver. It affords no characteristic symptoms and is not recognized during life.

Hyperæmia is characterized by uniform enlargement of the liver without alteration in the shape of the gland, with sense of fulness and distension in the hepatic and gastric region. *Active hyperæmia* results from overeating, from exposure to the heat of tropical countries, favored by imprudent habits, especially drinking, or from chilling after exposure to heat. It is also a feature of malarial poisoning, and may occur in connection with suppressed menstruation, particularly in women near the climacteric. It may result from contusions or wounds of the liver. *Passive hyperæmia* is common, and is due chiefly to mechanical obstruction to the outflow of blood from the liver (see article on Congestion of the Liver); it is also, less often, an expression of malaria or a feature of some infectious diseases.

There is congestion of the hepatic vessels and deposition of bile pigment in the adjacent hepatic cells, giving to these parts a dark coloring; this is strongly contrasted by the light appearance of the interlobular veins; thus, upon section, there is produced that semblance to a cut nutmeg which has led to the use of the term "nutmeg-liver." The continued distension of the hepatic vessels eventually causes atrophy of the liver cells, increase of the connective tissue, enlargement and hardness of the liver, and finally, in some cases, contraction of the gland.

The symptoms produced are enlargement of the liver, hardness, tenderness on pressure, and a vaguely distressing sense of fulness and distension in the hepatic region, especially when

lying on the left side. The tongue is furred, digestion deranged, there is bilious vomiting and bilious diarrhœa, sallowness of complexion and, at times, moderate jaundice. Bile is often thrown freely into the intestine, and then causes griping and acrid, smarting evacuations. Headache, irritability of temper and general weariness and dulness are often present, with, in severe cases, irregularity of the heart's action.

When hyperæmia is the result of long exposure to malarial influences or to a tropical climate, chronic enlargement may develop, with, sometimes, structural changes. There will then be sallowness of complexion, weakness of circulation, with remarkable sensitiveness to changes of temperature, chilliness, irritability, lassitude, depression, headache and dizziness. The skin becomes dry; the bowels irregular, either stubbornly constipated or loose; the urine is loaded with urea and bile. Indigestion is usually pronounced.

Acute congestion generally disappears with the correction of its causes and under proper symptomatic treatment. In very stubborn cases depletion of the portal system by salts has proved useful. In extreme cases, such as are seen in the tropics, the withdrawal of a considerable amount of blood from the liver, by means of the aspirator, is successfully practiced.

Thrombosis of the portal veins occurs in cirrhosis, from extension of cancerous diseases generally, from peritoneal inflammation involving the gastro-hepatic omentum, and from perforation of the vein by gall-stones. Nature obtains relief by the establishment of collateral circulation, and the vein then may eventually be represented by only a fibrous cord (*pylephlebitis adhesiva*).

Suppurative pylephlebitis is a suppurative inflammation of the portal vein and its branches which may involve the entire portal system within the liver and may even extend from the main branch into the mesenteric and gastric veins. The liver is usually enlarged, with normal surface. In some cases little pus-pockets are found beneath the capsule; these communicate with the portal vein and represent its distended suppurating branches. The pus may be laudable or fetid and stained with bile.

Diseases of the *hepatic artery* and *hepatic vein* are rare and difficult of recognition. In the former, dilatation, sclerosis and

aneurism have been seen; in the latter, dilatation in connection with chronic enlargement of the right heart, embolism, and very rarely stenosis of the orifices.

DISEASES OF THE PANCREAS.

So far, positive knowledge of the diseases of the pancreas is exceedingly limited; their causation and symptomatology are vague, and their recognition during life is more often a matter of conjecture, based upon a process of "exclusion," than a clear-cut, positive diagnosis. The following symptoms point to the possibility of existing pancreatic diseases: the presence of fat in the stools; the presence of fat in the urine (lipuria); polyuria. These symptoms, however, are only suggestive, since each may occur in morbid conditions elsewhere, the pancreas being healthy.

Pancreatic Hæmorrhage occurs, usually, in males of more than forty years of age. Nothing positive is known concerning its ætiology. The entire gland or portions of it may be infiltrated; the hæmorrhage may involve the adjacent subperitoneal tissue, invading even the fatty tissues of the omentum and mesentery and that surrounding the kidney. Fatty degeneration in connection with hæmorrhage is frequent. The gland may be normal as to size and structure; in some cases there is slight enlargement; in others a granular state of the epithelium is found.

The symptoms are vague. Pain may be so slight as to be scarcely noticeable or it may be intense. It involves the epigastric or lower thoracic region or the abdomen. There may be nausea and vomiting and diarrhœa or constipation. Collapse and death, due "to shock through the solar plexus" (Zenker), may occur within a few hours.

That pancreatic hæmorrhage may take place without being recognized and without terminating fatally has been demonstrated by *post-mortem* evidence. Hæmorrhagic pancreatitis, cysts and circumscribed peritonitis of the lesser omental cavity are common sequels in non-fatal cases.

Treatment is limited to measures for the relief of pain and stimulants in case of collapse.

Acute pancreatitis may be hæmorrhagic, gangrenous, or suppurative.

Acute hæmorrhagic pancreatitis, as the name suggests, is an inflammation of the gland attended with hæmorrhage within the pancreas. Little is known of its ætiology. It may follow pancreatic hæmorrhage; is nearly always seen in male adults over thirty years of age; is known to have resulted from trauma and to occur in persons who have suffered from gastro-duodenitis (extension of inflammation along the pancreatic duct), and presumably finds a predisposing cause in habits which, like chronic alcoholism, give rise to gastric or gastro-duodenal catarrh.

Morbid Anatomy.—The pancreas is enlarged uniformly or at one extremity—preferably the head—the size of the gland depending somewhat upon the amount of fatty tissue present. Section shows hæmorrhagic infiltration limited to the gland, chiefly into the interlobular tissue, or involving the peripancreatic structures. The appearance of the gland is red of varying shades, more or less mottled from the presence of fat. Small, opaque white specks or streaks are abundant and most numerous about the lobules; these are due to the fat-necrosis of Balser. This consists of fat-necrosis scattered throughout the pancreas, characterized by a peculiar opacity of the fat-tissues, which is due to the presence of fat-crystals, either of stearin or of fatty acids combined with lime. Various bacteria also are present, and experiments have shown that possibly these are responsible for the crystallization of the fatty acids. Balser's fat-necrosis is highly characteristic of pancreatic disease. Vomiting of bilious, red or blackish matter is common, accompanied with constipation or, less often, diarrhœa. Tympanitic distension of the abdomen is not infrequent. Fever is not marked, but delirium is often seen, even early. The tendency is to collapse, preceded by hiccough and frightful pain. Osler thinks involvement of the cœliac plexus and the stretching of the nerves may account for the agonizing pain and the sudden collapse. The *termination* in the great majority of cases is fatal within two or three days or a week at the most. The inflammation may assume a gangrenous character.

The diagnosis is uncertain, owing chiefly to the difficulty of differentiating from acute perforative peritonitis and intestinal obstruction.

Acute gangrenous pancreatitis is the result of hæmorrhagic inflammation of the pancreas.

The symptoms are much the same, with a rather higher temperature in the gangrenous form, often reaching 103° or 104°. There is a tendency to an acute peritonitis which rarely extends to the general peritoneal cavity. There may be considerable vomiting, diarrhœa, pain and sometimes hæmorrhage. Death usually occurs from collapse in from ten to twelve days.

The appearance of the gland is that of a gangrenous mass, dark, slate-colored, and horribly offensive. It may be held in a spongy mesh-work of infiltrated tissue or lie almost free in the omental cavity, attached to the wall by a few thread-like fibres; or the gland may be found in a large abscess cavity forming an appreciable tumor above and to the left of the umbilicus; or it may be discharged through the intestine, in which case the patient is liable to recover. The adjacent structures are of necessity more or less implicated.

The diagnosis, according to Fitz, rests chiefly upon the recognition of a deep-seated peritonitis extending downward from the epigastric region.

The treatment is that of a circumscribed peritonitis, becoming surgical as soon as the character of the affection is distinctly recognized.

Acute suppurative pancreatitis occurs in those forms of acute inflammation of the gland which fail to recover, but escape gangrene. Fitz states that there is nothing in the ætiology of the original attack "in virtue of which this form of termination may be anticipated."

The pancreas may be studded with a large number of small abscesses, which may communicate with each other; again, one large abscess may be found, containing creamy pus, the contents becoming "cheesy" when the affection has assumed a thoroughly chronic form. Involvement of the peripancreatic tissues is common. The abscess may discharge into the duodenum or break through the peritonæum, in the latter case giving rise to fibro-purulent peritonitis. Fatty necrosis is rare, as compared with other forms of pancreatitis.

The symptoms are vague and difficult of recognition. Manifestations of inflammation of the gland, as severe pain in the left upper abdominal region, vomiting, abdominal distension, etc., are present, accompanied with shiverings, chills and irregular fever—symptoms, in short, which would indicate the formation of pus in any other part of the body. Slight jaundice and pain in the hypochondria, with hepatic and splenic enlargement, may occur. If the abscess breaks and empties, this is commonly preceded by aggravation of the pain and accompanied with temporary collapse, followed by marked improvement and recovery. In chronic cases the fever is very slight, the skin often is bronzed, the urine may contain sugar, and the course of the disease is exceedingly tedious.

The prognosis is hopeless, death from septicæmia or ascites, with extreme debility and emaciation, taking place within a period varying from a few weeks to several months or a year, according to the acute or chronic character of the case.

Chronic pancreatitis is exceedingly difficult of recognition. It occurs in connection with (congenital) syphilis or diseases of the digestive organs, as gastro-duodenal catarrh, or as an incidental feature of gastric or duodenal ulcer, tumor of the stomach, etc. Obstruction of the pancreatic duct, extension of a chronic inflammation of the adjacent peritonæum, or circulatory disturbances in the heart, lungs or liver are among the occasional causes of it.

Anatomically there is an increase of fibrous tissue, causing enlargement of the entire gland or of a part of it, oftener the head, with increase of its weight. When there is shrinkage of the fibrous tissue, lessening of the size of the gland results, a condition which oftenest obtains when there is obstruction of the ducts. The organ is dense, almost cartilaginous, with smooth or granular surface.

The symptoms are not characteristic. Difficulties of digestion, as from gastric catarrh, are present in many cases, eventually by their persistence giving rise to much debility and great loss of flesh. Diarrhœa is more frequent than constipation, the stools being fatty and colorless. There often is epigastric pain and tenderness to pressure, varying greatly in degree. Moderate ascites, slowly progressing enlargement of the spleen and glycosuria have each been observed.

The *course* is tedious and toward a fatal termination in the larger number of cases.

The treatment is symptomatic. Diet should be chiefly farinaceous. The use of minced pancreas or of pancreatin is highly recommended.

Cancer of the pancreas occurs in about six per cent. of all cases of cancer. It is a disease of middle life; more than two-thirds of all the cases occur in males. It may be primary or secondary, and may involve the entire gland or parts of it; if the latter, preferably the head. The scirrhus form is by far the most frequent. Soft varieties, however, are seen; their vascularity may be the occasion of severe and even fatal hæmorrhage into the duodenum, stomach or peritoneal cavity. Extension of the cancer to adjacent parts is the rule.

The *symptoms* are indistinct in the early part of the disease. Derangements of appetite and digestion are common; entire loss of appetite is present in some cases, while others suffer from ravenous hunger and thirst, with, usually, polyuria. Flatulency, heartburn, etc., are frequent. Vomiting becomes a common symptom as the disease advances; the ejected matter may contain blood from the ulcerating surface of the tumor. Blood may also be present in the stools, which are rather frequent and rarely contain fat. Pain is present after the disease is well established; as usual in cancer, it is severe, often occurs in paroxysms, and may then closely resemble a neuralgia involving the lumbar region. Progressive weakness, emaciation and eventually a clearly pronounced cancerous cachexia are to be expected. The urine, in the later stage, is albuminous; sometimes it contains sugar.

A tumor may be discovered in about one-half of the cases. It is deep-seated and fixed, though later it may become slightly movable. It is firm, irregular, roundish. Pressure upon the bile ducts gives rise to persistent jaundice. Ascites is caused by compression and obliteration of the portal vein. Even obstruction of the duodenum from a very large pancreatic tumor is possible.

The *course* of the disease is usually rapid. Death occurs from debility and emaciation or incidentally from intraperitoneal hæmorrhage or pulmonary embolism, the patient rarely surviving more than a year.

The diagnosis rests largely upon the presence of the tumor and upon the recognition of muscular fibres in the stools in case of a generous meat diet, as well as upon "the absence of carbolic acid in the urine when a drachm of salol is taken in divided doses during the day" (Fitz).

When small, the tumor lies behind the stomach and transverse colon; when it is large, it is easily mistaken for cancer of the pylorus, duodenum, transverse colon, or liver. The following points are to be borne in mind: *cancer of the pylorus* has dilatation of the stomach, absence of free hydrochloric acid, rarely bilious vomiting, and is rather freely movable; *cancer of the transverse colon* has evidence of intestinal obstruction, presence of indican in the urine, and can usually be located by inflating the rectum. Duodenal cancer cannot be differentiated.

The prognosis is unfavorable; the appearance of jaundice and ascites means a probably fatal termination within two months.

Pancreatic cysts are due to the impaction of biliary calculi at the orifice of the common duct or of pancreatic stones within the duct of Wirsung, or to the obliteration of the duct from cicatricial contraction.

The chief symptom is the presence of a tumor in the epigastric region, usually somewhat to the left of the median line; it may, however, project far enough to the right to be mistaken for a distended gall-bladder. In exceptional cases the cyst may be sufficiently large to fill a considerable part of the anterior abdomen, even as far as the brim of the pelvis. "It usually appears in the left hypochondrium, between the costal cartilages and the median line; more rarely it is felt in the vicinity of the navel. It is globular, resistant, not elastic, smooth, usually changing its position somewhat with the movements of the diaphragm, and possessing a slight degree of lateral motion. It often transmits the pulsation of the aorta, but has no expansive pulsation. When deep-seated, it gives no sense of fluctuation, but as it nears the surface a wave is readily transmitted. It is dull on percussion, and on auscultation a systolic souffle has been heard, transmitted from the underlying and compressed aorta." (Fitz.)

Constitutional symptoms are rarely noticed, even when the cyst has attained considerable size. At times there is much

pain, radiating from the vicinity of the ensiform cartilage to one side, oftener to the left, sometimes into the left shoulder or even into the left side of the face; the pain may be almost continuous or it may occur in severe paroxysms, with symptoms threatening collapse. Disturbances of digestion, jaundice, epigastric fulness and tenderness, irregularity of the bowels, loss of flesh and debility exist with varying uniformity and intensity. When the tumor is very large, embarrassment of respiration and œdema are commonly present.

The *duration* is exceedingly indefinite, since cases may come to a complete "stand-still" for years. Very sudden enlargement suggests hæmorrhage into the cyst.

The *prognosis* must be guarded; possible interference with the circulation and respiration, resulting from a large tumor, and danger from rupture, must be borne in mind.

The *diagnosis* depends upon the recognition of the tumor. "Aspiration results in the escape, under considerable pressure, of an alkaline fluid, often more or less blood-stained, which usually emulsifies fat, saccharifies starch, more rarely peptonizes albumin." Mistakes are frequent.

The *treatment* consists of the establishment of drainage or extirpation.

Pancreatic calculi are connected with chronic inflammation and obstruction of the duct. They consist chiefly of carbonate of lime, are white or opaque, soft, roundish, sometimes oval, and occur singly or in large numbers. Occasionally they are elongated, rough and branched, bearing some resemblance to a piece of coral. They are commonly associated with dilatation of the duct, chronic pancreatitis, abscess, atrophy, and, rarely fistula of the gland.

The *symptoms* are vague, consisting of disturbances of digestion which are common to all forms of pancreatic disease. However, sharp, radiating pains, starting from the pancreas, and not unlike those of biliary colic, at times with jaundice, are frequently noticed. Fitz emphasizes the value of progressive, sometimes extreme, emaciation and debility, associated with fatty stools and glycosuria, with occurrence of paroxysmal pains as described. "The latter eventually cease, perhaps to be followed by the development of a cystic tumor in the epigastrium. When a calculous pancreatitis is associated with dia-

betes, excessive appetite and thirst become conspicuous symptoms."

The duration is indefinite and the prognosis grave. Death may occur suddenly from perforation.

Therapeutics.—In view of the slight knowledge had of pancreatic disease, the absence of clear-cut symptoms, and the rapidly fatal termination of acute inflammation of the gland, it cannot be a source of surprise that clinical experience with remedies is both limited and unsatisfactory.—**IRIS VERSICOLOR** has, it is claimed, caused pancreatitis, and it is recommended in the treatment of the acute forms on strength of the following symptoms of the drug: burning distress in the region of the pancreas; vomiting of sweetish water; saliva has a greasy taste; diarrhœa containing undigested fat.—**BARYTA MURIATICA** has many gastric symptoms which may occur in affections of the pancreas, but hardly anything which specifically points to special value in this class of disease. Good results, however, have been claimed for it by some clinicians.—**IODINE** is highly recommended by Rademacher, Reil, Hughes, and others; it has been given in small doses of the tincture in water. It has many striking gastric symptoms, as "canine hunger" and fatty diarrhœa, in connection with symptoms which should render it important here.—**MERCURY** is considered useful by Reil.—**PHOSPHORUS**, by its close relation to fatty degeneration, generally suggests itself. I know of no cure of any disease of the pancreas made by it.

It is more than probable that a closer knowledge of the diseases under consideration and a proper estimate of the symptoms which characterize them will eventually afford the profession opportunity for an intelligent selection of remedies.

DISEASES OF THE PERITONÆUM.

ACUTE PERITONITIS.

Acute peritonitis or inflammation of the peritonæum may be primary (idiopathic) or secondary; general (diffuse) or localized (circumscribed). Idiopathic peritonitis is a rather rare affection, and is usually the result of cold or exposure (rheu-

matic peritonitis); nearly all forms of peritoneal inflammation are secondary. Localized or circumscribed peritonitis will be considered in so far only as it differs from the diffuse form.

Ætiology.—*Perforation* is by far the most important of all the causes. It is an accident which may occur from external wounds (including operations), but is oftener seen in ulceration of the stomach, intestines, gall-bladder, abscess of the liver, spleen or kidneys; it may also take place in connection with the ulceration of typhoid fever, dysentery, appendicitis and tuberculosis; or from a rupture of parametric abscess into the peritonæum. *Extension* of inflammatory processes to the peritonæum is common. Here belong the various inflammatory affections, especially the suppurative, of the abdominal and pelvic viscera. *Septic infection* takes place with great ease when there is suppurative inflammation, especially of the female pelvic organs, as about the ovaries and Fallopian tubes. Peritonitis occurs, more rarely, in small-pox, scarlet fever, measles, acute rheumatism, intermittent fever, scurvy, hæmorrhagic purpura and nephritis.

Morbid Anatomy.—Injection of the sub-peritoneal blood-vessels and minute hæmorrhagic effusions occur in the early stage. The peritonæum assumes a clouded aspect and is covered, uniformly or in patches, with fibrinous exudation. The intestinal coils are distended with gas; their walls become œdematous and friable, so they tear easily; adhesions may form between them which shortly become remarkably firm. A liquid exudation is thrown out early, always in the dependent parts, as the pelvis and loins, unless it be confined by adhesions. The amount of this exudation varies from a few ounces to several quarts. It may be fibrinous, sero-fibrinous or purulent, modified by the peculiar features of each case. Thus, the exudation may contain food when there is perforation of the stomach; fæces when the intestine is the seat of a similar accident; it may be hæmorrhagic (from wounds, ulcerations) or putrid (as in cancer). Bacilli are found in large numbers; of these the streptococcus pyogenes and the bacillus coli communis are the most common.

Circumscribed peritonitis does not differ from the diffuse in any essential feature. The inflammatory action and changes are rather less intense in degree, and in the purulent form ad-

hesions are more quickly formed; this is illustrated in appendicitis and in the pelvic peritonitis occurring in connection with puerperal inflammation.

Symptomatology.—The onset is sudden, consisting of a violent chill or of shivering, with intense pain in the abdomen. *Pain*, in nearly all cases, is present from the beginning, and throughout constitutes an important and characteristic symptom. Cases in which there is no pain are practically confined to exceptional instances in which the vitality is extremely low and the sensorium blunted, as in typhoid fever, and here the peritonitis itself may escape detection. The pain frequently begins at some particular point, and then is of special value in fixing the seat of the perforation, but soon it spreads over the entire abdomen; it usually is most intense just below the umbilicus, but may be felt in other parts at the same time, or may be felt only in other parts, as in cases of perforation of the stomach, where it is in the chest, back, and shoulders. It is intense and often continuous, with sharp paroxysms of exacerbation. It is made worse from the slightest movement; the patient instinctively recognizes this by carefully avoiding even normally deep breathing and talking. To cough means torture. Associated with it is exquisite tenderness of the entire abdomen to touch, pressure, or jar. The patient lies on his back, with the legs drawn up, often anxiously avoiding even the pressure of the bed-covering and manifesting intense suffering from any attempt to move him or from touch. *Vomiting* is nearly always an early symptom; it may be present from the very beginning and exist throughout. In some cases there is persistent nausea. The vomitus consists first of the contents of the stomach; later it becomes bilious, yellow, then green; finally the contents of the small intestine are vomited, with more or less pronounced faecal odor. *Abdominal distension* is early, common, and sometimes very great. It is tympanitic in character, although in some cases effusion exists. The distension, generally speaking, is most pronounced in cases where the abdominal walls are thin and yielding, as in the puerperal state, and least marked in persons of fine muscular development. Percussion over the distended intestinal coil yields a resonant and tympanitic sound; there is dulness wherever extensive effusion exists, hence most pronounced in the depend-

ent parts of the abdomen; the sign may, however, be covered up by excessive tympanitis. Palpation also reveals the presence of liquid. The excessive tenderness of the parts renders it difficult to employ these methods, save for diagnostic purposes in case of absolute necessity. When the distension is extreme, the abdomen protrudes, dome-shaped; the skin is drawn tense and appears shining, and the underlying coils of intestine may be plainly seen. In such cases the diaphragm is forced upward, with displacement of the heart, lungs and liver, and marked changes in the area and extent of hepatic dulness. The gaseous distension may yield somewhat after the second day.

Symptoms of gastro-intestinal irritation are rarely absent. Of these, vomiting has already been mentioned. It is often accompanied with frequent eructations, and there may be persistent and painful hiccough, especially when the upper abdomen is the seat of the peritonitis. The tongue at first is moist and coated white; later it becomes dry, red, brown and cracked and fissured. The bowels are constipated from muscular weakness of the intestines or there is diarrhœa, probably due to intestinal catarrh. Micturition at first is frequent and slightly painful; later, retention from paralysis of the muscular coat of the bladder is not uncommon and necessitates the use of the catheter. The urine is scanty, high-colored, of high specific gravity, acid reaction, and rich in indican. The temperature of the body rises rapidly after the initial chill, reaching perhaps 104° or 105° ; then it drops, and usually remains below 102° or even 100° ; in some cases it is subnormal, and, again, just before death takes place, it may suddenly rise to 108° or 110° . In the main, the elevation is moderate and the fever irregular. The pulse is small, hard, wiry, then feeble, almost imperceptible, with 110 to 140 beats per minute. Respiration is shallow and rapid—thirty or more to the minute—from the pressure exerted upon the diaphragm by the tympanitic abdomen and its effects upon the lungs and heart; it is also unfavorably affected by the excessive soreness and aggravation of the abdominal pain from the respiratory movements. The mind is usually clear throughout.

Effusion of fluids occurs in all but exceptionally severe cases with unusually rapid fatal termination.

Tendency to collapse constitutes one of the most striking pe-

cularities of acute diffuse peritonitis. The appearance of the patient is such as to forcibly impress itself upon the mind of the by-stander. His position is on the back, with legs well drawn up. The countenance is haggard, drawn, old, anxious; the nose is pinched, the eyes sunken, the temples collapsed, the ears cold and prominent, the lips dry, dark, lifeless. The extremities are cold, bluish, and the skin of the hands is loose and wrinkled. The entire surface of the body looks lead-colored, livid, the whole forming a picture of extreme weakness, dumb suffering, and of approaching dissolution.

Localized or circumscribed peritonitis presents a very similar group of symptoms, but less intense and modified by peculiarities of location and the nature of the primary affection, with, in the main, far better chances of recovery. Of these, the *appendicular* form has been described (see article on Appendicitis). *Pelvic* peritonitis belongs to the domain of gynæcology, and only requires mention here. An interesting form of localized peritonitis is seen in connection with abscesses sometimes observed in perforations of the stomach or transverse colon, lying between the liver and the diaphragm. The peritonæum covering the liver may be the seat of inflammation, as in cancer or abscess of the liver, etc., or from extension of suppuration, tuberculosis, or cancer from the pleura.

Struempell makes mention of a rare form of circumscribed purulent peritonitis which is occasionally seen in children as the result of exposure. It declares itself by a painful, fluctuating tumor above the left groin, which usually points into the rectum and ends by recovery.

The *course* of *Acute Diffuse Peritonitis* is almost always rapid and toward a fatal termination, death occurring in particularly severe cases in from thirty-six to forty-eight hours, and in three to six or, at most, ten days in the less pronounced cases. Death is due to complete failure of the vital functions or to paralysis of the heart. Among the least hopeful forms is peritonitis resulting from perforation of the stomach or intestine and puerperal septic peritonitis. In very exceptional cases the disease may assume a chronic form, the effusion becomes reabsorbed, and the severe symptoms gradually disappear. Eventual complete recovery, however, is rare in such cases, owing to the extensive mischief done by the firm inflammatory adhe-

sions and the effect of the inflammation upon the membrane itself. Death here usually results from exhaustion. In other instances, also exceptional, the inflammation may become limited by the peculiar character of the adhesions formed, resulting in an abscess which may rupture through the abdominal walls or empty itself into the intestine; such cases usually recover.

Diagnosis.—The recognition of acute diffuse peritonitis is rarely attended with serious difficulty. The suddenness of the onset; the vomiting, pain and excessive tenderness in the abdomen, with tympanitis; moderate fever after the first rise of the temperature; the gravity of the constitutional symptoms, rapidly tending to collapse, are clear and unmistakable. It is more difficult, but often important, to determine the primary cause of the peritonitis. This is usually found in the history of the case (appendicitis, ulcer, etc.) or, as in women, may be ascertained by careful examination of such organs as might prove the starting point of inflammatory action. In the very early stage it is possible to mistake various forms of *colic* (renal, biliary, gastro-intestinal, menstrual) for the pain of peritonitis, but these forms of colic are almost always associated with such local symptoms as will suggest their origin, and generally lack the steadiness of the pain, with paroxysmal aggravations rather than cessation, which belongs to peritonitis. The diseases most liable to be mistaken for peritonitis are: acute gastritis; acute entero-colitis; puerperal metritis; intestinal obstruction; hysterical peritonitis; cystitis with distension of the bladder. To these might be added a long list of affections, commonly complicated with peritoneal involvement, which are of rare occurrence and difficult of recognition.

In *Acute gastritis* the pain and tenderness are centered in the epigastric region; vomiting is earlier, more pronounced and more stubborn; the history of the case differs from that of peritonitis. *Acute entero-colitis* has more distinctly "colicky" pains; the pain is oftener confined to the umbilical region; occurs in paroxysms; nausea and vomiting are more aggressive; tympanitis is not so extensive; diarrhoea is more frequent. *Puerperal metritis*: the symptoms are more localized and, even when this fact is not apparent, examination per vaginam and rectum reveals exquisite sensitiveness of the uterus to pressure. *Intestinal obstruction* is recognized chiefly by the history

of the case. *Hysterical peritonitis* occurs in women; there is usually a history of menstrual trouble; evidence of neurotic tendency; the onset is less violent and threatening; deep pressure can generally be borne quite as well as light touch. *Cystitis* with *distension* of the bladder may resemble peritonitis with retention of urine and strangury. Here the use of the catheter promptly relieves the distension; the urine contains mucus and pus, sometimes crystals of phosphates.

Treatment.—The patient is anxious to remain quiet and in the most comfortable position; it is therefore well to so arrange pillows to the head, back, sides or limbs that he can have perfect rest and be spared the necessity of exerting himself. Unwearying attention to this is a source of great comfort to the sick. The most urgent symptoms, i. e., pain, vomiting, hic-coughing, and the suspension of active peristalsis, are by the dominant school met by the exhibition of opium in heavy doses, carried to the point of producing toxic symptoms. The drug here usually is given by the mouth, in doses of one-half to one grain every hour, or one-quarter of a grain subcutaneously, until the patient is wholly under its influence. Valid objections to such treatment can readily be adduced, but it cannot be denied that the results obtained are at least no more discouraging than that had under other methods, and it affords a degree of relief from suffering which cannot otherwise be secured. The tolerance in peritonitis of very large doses of opium is well known. It is evident that care is necessary not to exhibit the drug beyond the point of safety. In *circumscribed* peritonitis Struempell voices the opinion of the German school when he advocates local bleeding by leeches.

Hot applications tend to relieve pain, and may be used in the form of flax-seed poultices—not too heavy—covered with oiled silk or rubber bags filled with hot water. Cold is well-borne by some patients; if used, it is best to put small pieces of ice in a rubber-bag or to mix the ice, finely broken up, with dry linseed-meal, making ample provision, by the free use of cotton or woolen cloths, to have the water absorbed as quickly as the ice melts. Vomiting is not easily controlled. Kuessmaul places much reliance upon siphonage; lumps of ice swallowed may give relief. In my own experience a teaspoonful of very hot and strong black coffee, given every little while, is often

satisfactory. Excessive meteorism demands the use of turpentine externally; an enema containing a few drops of the oil is often useful. Lavage of the stomach, or the long rectal tube, introduced as high as possible, and in extreme cases puncturing the intestine with a fine trochar, are also advised. Laxatives or cathartics for the relief of constipation are to be discountenanced. Mild saline laxatives, given in hot water, are recommended by Tait, Seyfurt, and many others, but this treatment has not been generally adopted, save in surgical practice. The occasional use of an enema is proper. Stimulants may have to be exhibited when collapse threatens. The diet is practically restricted to milk, hot or cold, and peptonized, if so desired. The patient rarely expresses a wish for food, and it is not well to urge him. Rectal feeding is allowable, sometimes necessary. Therapeutics will be considered later.

CHRONIC PERITONITIS.

Chronic peritonitis is diffuse or localized. With the exception of the tubercular form it is a rather rare disease, and usually secondary.

Its ætiology is obscure. In some cases it is a sequel of acute peritonitis. When so, there is a history of slow improvement of the acute symptoms, with continued sharp, lancinating pains in the abdomen, chronic constipation, distension of the gall-bladder, repeated attacks of jaundice, tedious absorption of the effusion, and the formation of firm fibrinous adhesions in various parts of the abdomen; the latter often fix the organs in an abnormal position and thus give rise to a great variety of disturbances of which the first cause is not always easily recognized. In other cases the exudation may become encapsulated, not rarely leading to the formation of hard concretions, which in turn may be the starting point of renewed inflammatory action or make their exit through the abdominal walls or escape into the intestine or bladder.

Chronic *circumscribed* peritonitis may exist without being recognized during life. Even in cases where no characteristic symptoms existed during life, there have been found extensive fibrinous adhesions between abdominal viscera and the adjacent

peritonæum. Coils of intestine are firmly glued together; the liver may be attached to the diaphragm or abdominal wall; the uterus, ovaries and tubes may constitute an almost solid mass, firmly adherent to the broad ligament.

In both forms, the diffused and the circumscribed, the peritonæum itself is materially thickened; the omentum and mesentery are often shrunk and disfigured (peritonitis deformans).

Osler recognizes three forms of chronic peritonitis. Local adhesive peritonitis, which is most frequent about the spleen, "forming adhesions between the capsule and the diaphragm, about the liver, less frequently about the intestines and mesentery." It may give rise to intestinal obstruction by a coil of the intestine passing through a loop formed by a fibrous band. Diffuse adhesive peritonitis, with intestinal adhesions throughout and obliteration of the peritonæum. Proliferative peritonitis, characterized by great thickening of the peritoneal layers, sometimes without much adhesion. Here the omentum and mesentery show plainly the "rolling up" and "puckering" and "shortening" which are a prominent feature of the pathology of chronic peritoneal inflammation. The viscera, especially the liver and spleen, may be adherent or afford evidence of chronic inflammation of the adjacent peritonæum in the thickness and firmness of the surrounding capsule and, often, in the atrophy of the organs themselves.

Tubercular peritonitis is clinically the most important form of chronic inflammation of the peritonæum. This affection is still arbitrarily and unnecessarily distinguished from tuberculosis of the peritonæum. Tuberculosis of the peritonæum is the term applied to an invasion of the peritonæum by miliary tubercles without, or with very little, coincident inflammatory changes; it is acute or chronic. In chronic tubercular peritonitis the same tubercular deposits are present, and the inflammatory changes are pronounced, with effusion and often firm and extensive adhesions. The disease is secondary; it is an extension of tuberculosis from some other part of the body, usually the lungs and pleura, or from the intestines, retro-peritoneal lymph-glands, spleen, kidneys and female reproductive organs. It occurs oftenest between twenty and forty years of age. The *anatomical* changes are chiefly those of a chronic peritonitis. The peritonæum is studded with gray, glistening, translucent

granules, i. e. tubercles, slightly projecting and of the size of a pin-head, which cluster in patches and nodules of grayish-white, yellowish, cheesy appearance. The peritonæum at first is injected, and slight effusion of a clear yellowish liquid takes place. Later the membrane becomes thickened, ecchymosed, often covered with fibrous exudation, and undergoes the various types of adhesion which occur in other forms, producing the same effects. Often tubercular masses are found inclosed in sacs formed by the adhesion of opposing peritoneal surfaces, yielding upon palpation of the abdomen the same sounds which are heard in the presence of cancerous or other masses. Thickening and shortening of the mesentery; shriveling of the omentum; the formation of fistulæ; ulceration and subsequent emptying into the intestine of the contents of the pouches formed by circumscribed adhesions, are all complications liable to arise. The exudation is serous or fibrinous, but may contain pus and blood. The character of the peritonitis must be determined by histological examination of the masses and, if necessary, by inoculation experiments.

The condition described as *tabes mesenterica* belongs here.

A chronic *peritonitis of children* is also occasionally seen, occurring between the age of two and ten years, characterized by pallor, languor, some emaciation and moderate ascites which disappears in the course of a few months. Recovery is the rule.

The constitutional symptoms of chronic peritonitis are not uniformly distinctive. In many cases some inconvenience is felt from the abdominal enlargement, but general health remains good. In others there is loss of appetite and strength, some emaciation, slight and irregular fever, trifling pain in the abdomen, and some tenderness. Physical examination reveals the extent of the effusion and the region involved. After absorption of the fluid has taken place, with diarrhœa or increased flow of urine, it is usually an easy task to outline the peritoneal thickening and the tumor-like masses.

Tubercular peritonitis presents more striking symptoms. While the onset may be so gradual that the enlargement itself is the first symptom which attracts attention, there is in the majority of cases a considerable amount of pain, tenderness and fever. The pain and tenderness vary in degree, and may

be circumscribed or diffuse; they are severe only in exceptional cases. The fever is not high, but is much more uniformly present than in the non-tubercular forms. The abdominal enlargement, as in other forms of peritonitis, increases and lessens from time to time, and differs in different cases. Encapsulation of effusion is frequent; adhesions are common; all these not only affect the external appearance of the abdomen, but give rise to digestive disturbances, as loss of appetite, tormenting sense of fulness and oppression, diarrhœa, constipation, and even intestinal obstruction. Eventually the general health fails more and more; the patient wastes with increasing rapidity; other organs may be invaded by the tubercular disease, and death occurs from general exhaustion, from the effects of tuberculosis elsewhere, or from acute peritonitis due to perforation.

Diagnosis.—The diagnosis of simple chronic peritonitis rests largely upon the previous history of the case, the distension of the abdominal cavity with fluid, and upon the recognition of the structural changes (as thickening of the peritonæum, adhesions, etc.) which have been described. *Ascites* may be excluded by the absence of persistent gastro-enteric disease, jaundice, splenic enlargement, and hæmorrhage. *Tubercular peritonitis* usually occurs in persons who suffer from tuberculous affection in other parts of the system; the fever is irregular, at no time high; there is no disease of the heart, kidneys or liver; there is progressive emaciation and growing cachexia.

“In all forms of chronic peritonitis a friction may be felt usually in the upper zone of the abdomen” (Osler).

Prognosis.—In non-tubercular cases the prognosis is favorable, although the course of the disease often is very tedious and recovery may not be complete; indeed, complete recovery occurs only in exceptional cases. The tubercular form presents very little hope; even though the symptoms of peritoneal disease may disappear, the patient is almost sure to die of general tuberculosis. Whether, or not, the performance of laparotomy can materially reduce the death list is as yet an unsettled question.

Treatment.—The treatment consists chiefly of absolute rest and a diet of nourishing and easily digested food, with the relief of such symptoms as may from time to time demand immediate attention. No excuse can be made for the use of opium to relieve pain. Hot fomentations not only control this, but,

persistently applied for a long time, are credited with a directly beneficial action upon the disease. Various inunctions have been employed with the view of favoring the absorption of the effusion and of scattering the solid masses. Among these are solutions of iodine in olive oil (7 to 30 grains of iodine to one ounce of oil), mercurial ointment or green soap and water, the latter used daily until the skin becomes hard and scaly, taking care to avoid the navel and hairy parts and to thoroughly cover the parts, after the inunction, with oiled silk or a layer of thin, soft rubber. Tapping is indicated by extreme distension of the abdominal wall. Laparotomy may prove a radical cure in the non-tubercular form.

Therapeutics of Peritonitis.—**ACONITE.** Rheumatic form; in the first stage of all but the perforative form; in acute exacerbations of chronic peritonitis; pelvic peritonitis. Characteristic sthenic fever, with severe, agonizing, burning, cutting, darting pain in the bowels, worse from the slightest pressure or motion. Fear of death. Urine dark, scanty, hot. Abdomen swollen, hot, sensitive to the touch. In the puerperal state; suppression of lochia and milk; red, hot face; dry, hot skin; abdominal pain as above.—**APIS** (see Ascites). Much effusion. "Bruised" pain in the abdominal walls, which are very tender.—**ARSENICUM.** In cases with rapid and profound exhaustion of strength, tendency to collapse, and characteristic constitutional symptoms. Extreme soreness with burning heat. Dropsical tendency. Persistent sickness at the stomach, with painful vomiting. Relief from the use of external heat. Great distension of the abdomen. Urine dark, scanty. Metro-peritonitis; small, feeble, intermittent pulse; low state of the blood.—**BELLADONNA.** Of first importance. Painful, drum-like distension of the abdomen, with much heat and griping, pinching pain, often in one spot, worse from the slightest motion; exquisite tenderness of the abdomen, so that the slightest touch or the pressure of the bed-clothes, or a jar, is unendurable. Face flushed or deathly pale, with lustreless eyes. In metro-peritonitis and puerperal peritonitis, with the same symptoms, clawing pain, sensation as if the contents of the pelvis were crowded down and out through the vagina; urine passed with much pain, drop by drop; foetor of all the discharges.—**BRYONIA** is especially important at the time when the effusion

first begins to show itself. There is stitching, lancinating pain in the bowels, worse from motion, accompanied with great soreness throughout the abdomen; considerable fever, with thirst; heavy, white coating of the tongue, which later becomes dry and yellowish-brown; irritable, anxious, apprehensive mood; sleeps badly and dreams about his business affairs. Constipation. Involvement of the liver. Catching, stitching pain in the diaphragm and chest while breathing. Pelvic peritonitis.—*CALCAREA CARBONICA*. Useful in tubercular peritonitis, especially of children, with characteristic indications, as: leucophlegmatic temperament; "pot-belly;" scrofulous swelling of glands; ravenous hunger with craving for indigestible things and very hearty food, like hard-boiled eggs; indigestion; flatulency; moderate abdominal dropsy.—*COLOCYNTHIS*. Occasionally indicated by the characteristic intense "colicky" character of the pain, especially when located in the ovarian region.—*LACHESIS* is of service in the late stage of cases which have safely passed the first, most critical few days, and have then assumed a typhoid type. The abdomen is very sensitive, much as under *BELLADONNA*. The urine is scanty, turbid, with reddish sediment, or very dark, almost blackish. Feels worse every time he awakens from sleep; feels as though he would smother. Extremities cold; pulse rapid, weak, intermittent. Constrictive pain in various parts of the body, especially in the orifices. Tongue trembles and catches under the lower teeth. Typhlitis.—*MERCURY (MERC. CORR.)*. Highly useful, not only in the earlier stage, with intense burning pain in the abdomen, but also when the exudation has become purulent and cachexia is well defined. There is shivering and chilliness all the time. Cutting, stabbing, griping pains in the abdomen; copious sweating, sticky, hot, cold; it affords no relief, but adds to his discomfort. Complexion pale, sallow, earthy. Mouth feels slimy; tongue flabby and large, not heavily coated; foul breath; swelling, bloating of the feet. Typhlitis. Formation of abscesses.—*RANUNCULUS BULBOSUS*. In circumscribed peritonitis, with very severe sharp, stitching pain in the right hypochondria, with stitches and pressure on top of the shoulder, arresting breathing. Bruised pain; sharp pain in the region of the liver.—*RHUS TOXICODENDRON* resembles *LACHESIS* in that it acts best in the cases which assume a typhoid form. There is

great restlessness; dry, red tongue, red at the tip; feeling of a heavy weight pressing in the groin; tendency to foul, slimy diarrhœa; tympanitis; low, muttering delirium; pulse irregular, weak, intermittent. Metro-peritonitis.—*TEREBINTHINA*. Excessive tympanitis, with dull pain in the region of the kidneys, burning in the kidneys, pain extending from the kidneys down the ureters; burning during micturition; strangury; albuminous urine; urine looks cloudy and smoky.

Consult also: *ARNICA* when peritonitis results from traumatism, blow, etc.; low, typhoid state; tympanitis.—*CANTHARIDES*: burning pain in the sensitive abdomen; great anguish, restlessness, pallor; urinary complications.—*IODINE*: in tubercular peritonitis, or in the simple chronic form to hasten the absorption of liquids; scrofulous tendency. Ravenous hunger, but seems unable to appropriate what he eats; chronic hepatic disease; jaundice.—*LYCOPodium*: in chronic cases with characteristic dyspeptic symptoms and great flatulency; liver-complications; intense pain in the back when the urine begins to flow; sand in the urine.—*NUX VOMICA*: in tedious or special cases presenting characteristic gastro-intestinal symptoms.—*OPIUM*: when there is, or remains after an attack, stubborn constipation from paralysis of the intestinal muscular fibre; sometimes useful in acute attacks with marked constipation and the peculiar sopor of the remedy, with stertorous breathing.—*SULPHUR* in tedious, chronic cases, with slowly progressing re-absorption of the effusion and proper constitutional indications.—*VERATRUM ALBUM*: occasionally indicated by intense colic, with violent vomiting, coldness of the extremities and symptoms of collapse.—*VERATRUM VIRIDE*: highly praised by some reliable clinicians when peritonitis occurs in connection with pelvic inflammation. "Dry red strip through the center of the tongue." Intense fever and restlessness; rapid, weak pulse; excessive pain, tympanitis.

CANCER OF THE PERITONÆUM.

Cancer of the peritonæum is rarely primary, but in nearly all cases follows upon malignant disease of the stomach, liver, retro-peritoneal glands or sexual organs. It is a disease of middle life. It is usually of the scirrhus variety, but may be encephaloid, colloid or melanotic. The soft forms are more

often seen in the omentum and may constitute large, even enormous, growths. Chronic peritonitis, with more or less effusion, at times hæmorrhagic, is usually present; occasionally ascites is a conspicuous symptom. Pain and tenderness are often present. If the affection assumes the form of cancerous infiltration and thickening, friction sounds may be heard. Implication of adjacent organs is common. Perforation may take place.

The diagnosis depends upon the physical signs of morbid growth; presence of peritonitis and ascites; existence of malignant disease elsewhere, cachexia, and the result of histological examination. The *course* is chronic, nearly always with periods of exacerbation. Hæmorrhage may occur, giving rise to anæmia and fainting.

Colloid cancer of the omentum, according to Roberts, presents the following signs: Rather irregular enlargement of the abdomen; the umbilicus is stretched, not everted; palpation reveals the presence of firm, irregular masses; fluctuation, if present at all, is very indistinct; extensive dullness in the anterior abdominal region; change of posture produces slight, if any, effect upon the physical signs; presence of a slimy, gelatinous fluid, which may be removed by the aspirator and is occasionally discharged by the stomach or rectum.

ASCITES.

An accumulation of serous fluid in the peritoneal cavity.

Ætiology.—This condition is in reality a symptom due to local or general causes. The former are: chronic (simple, cancerous, tuberculous) inflammation of the peritonæum; obstruction of the portal vein from any cause; pressure from abdominal tumors. The latter are: such chronic diseases of the heart (valvular disease) or affections of the lungs (emphysema, fibrous pneumonia) as obstruct the passage of blood through the heart; low cachectic states of the system, connected with wasting diseases; hydræmia; general dropsy (as the dropsy of Bright's disease). It is an affection of adult life, but is occasionally seen in young persons and children, even at birth.

Morbid Anatomy.—The peritonæum is normal, perhaps somewhat thin in patches, except after tapping, where there may be evidence of narrowly circumscribed and moderate in-

flammatory action. The exuded fluid is a clear serum of light yellow color; it may be of a greenish tint from the presence of biliary coloring matter (cirrhosis of the liver) or reddish or brown from the presence of blood pigment (cancer, tuberculosis). It has a specific gravity of 1.010 or 1.015, which in cancer of the liver may be 1.023. It is alkaline or neutral, contains albumin (from 3 to 6 per cent.), and may coagulate spontaneously; large amounts of urea may be present in uræmia. Sometimes it is chylous, turbid, milky (chylous ascites); in cases depending upon cancerous or tubercular disease of the peritonæum it may contain fat-globules (adipose ascites).

Symptoms.—The symptoms are those arising from the pressure of the accumulated fluid upon the abdominal organs, consisting of a sense of fulness, weight and pressure, with crowding upward of the liver, lungs and heart. Breathing becomes embarrassed; the patient is unable to lie down and rest. Digestion is deranged; there is nausea, easy vomiting, and often constipation. Urine is passed frequently and in small quantities; it is high-colored, albuminous, of high specific gravity. Emaciation is marked in old cases.

Inspection shows a protruding abdomen, round and bulging, with smooth, shining surface, dry skin, lineæ albicantes; the umbilicus is soft, round, protruding, sometimes almost obliterated. When the patient lies on the back the fluid seeks the most dependent part, and there is flattening of the anterior abdomen and bulging in the flanks. When made to stand, the bulging is in the front. The veins are distended; their current reversed; varicosis may arise from thrombosis or portal obliteration (caput Medusæ: dilatation of the veins about the umbilicus from stasis in the portal vein). *Palpation* by striking quickly and sharply upon one side of the abdomen with the fingers of one hand conveys a wave-like impulse to the other hand placed upon the opposite side, most distinct near the top of the area of dulness; this is less distinct if the abdominal walls are very thick or the tension is either very great or very slight. The edge of an assistant's hand or of a book placed in front of the abdomen aids in overcoming the obstruction from a fatty or œdematous abdominal wall. *Percussion* elicits resonance over the floating stomach and intestines, which in the dorsal position is clearest in the epigastric region, unless the intestinal

contents are fluid rather than gaseous, or adhesions or shortening of the mesentery hold the intestine to the side. The line of dullness is usually curved and always shifts to the dependent parts. Physical examination is of slight, if any, value unless the accumulation is extensive.

Diagnosis.—A large *ovarian cyst* may be mistaken for ascites. Change of position, however, does not in this case so readily or even materially affect the sounds elicited by percussion; the tumor more often is unilateral; the history of the case and examination per vaginam and rectum will also afford important data. In rare cases a *distended bladder* may resemble ascites. The history of the case, “dribbling” of urine, and the prompt relief of the distension from catheterization should solve all doubts.

Treatment.—The use of cathartics, as bitartrate of potash, is often followed by a ready disappearance of the dropsy when it depends upon renal or cardiac disease. Tapping, however, in the larger number of all cases, eventually becomes necessary. It is indicated by the amount of distress, especially in breathing, caused by the accumulated fluid. The operation is comparatively simple and free from danger, and usually is followed by immediate temporary relief and by improvement of the nutrition. In some cases it amounts to a cure of the symptom, no reaccumulation of the fluid taking place. In cirrhosis of the liver the wisdom of tapping “early and often” is generally recognized. It is, however, a safe general rule, amply proved in practice, not to tap until the absolute necessity for doing so is obvious. The late Dr. E. U. Jones strongly recommended compression of the abdomen by means of a wide roller bandage, with friction over the abdomen, after the performance of paracentesis.

Therapeutics.—In view of the fact that ascites is a symptom which depends upon some other and primary disease, it is seen that the true curative remedy takes cognizance of both the primary disease and the effusion, and that on this account alone the list of possibly indicated remedies must be very large. If, for instance, the ascites arise from some disease of the liver or heart, all the remedies capable of curatively affecting the liver and the heart must be studied, but with particular reference to their power of also causing dropsy. On the other hand, such drugs

as may, by stimulating the action of the kidneys, bowels or skin, carry off a portion of the accumulated fluid, without reference to the primary cause of the effusion, may become valuable aids in at least affording temporary help. To the latter class belong APOCYNUM, PILOCARPINE ($\frac{1}{20}$ to $\frac{1}{4}$ of a grain), BITARTRATE OF POTASSIUM (10 to 60 grains), APIS, and others; several of these, as APIS, appear to combine the homœopathic, specific and curative action with valuable physiological effects.

APIUM VIRUS should always be used fresh, but especially so in ascites; unless fresh, it will disappoint the prescriber; it must be used low when stimulation of the kidneys is desired. Bruised feeling in the abdominal walls, especially upon deep pressure; stinging, burning pains; urine scanty, dark, bloody, loaded with casts. Dryness of the skin. Absence of thirst. Great difficulty of breathing; must sit up.—APOCYNUM CANNABINUM. Stomach irritable, retains nothing; scanty, muddy urine; great thirst, but drinking causes distress and vomiting. To act directly upon the kidneys, it should be given in increasing doses of the tincture of the fresh root or of an aqueous infusion, beginning with at least five-drop doses every three hours, increasing rapidly until a watery diarrhœa sets in. It is not always well-borne, often causing gastric irritation; yet it is one of the most valuable drugs in dropsical conditions.—ARSENICUM. In cases depending upon disease of the liver, kidneys, heart, and in low cachectic states. Its constitutional symptoms must be present.—AURUM is less useful here than in merely œdematous conditions of the lower limbs. Sometimes, however, its constitutional symptoms are present and call for its exhibition, especially in cardiac and hepatic affections.—CHINA, when there is great anæmia, extreme exhaustion of the vital forces from loss of blood (purpura hæmorrhagica); from nursing, or any cause that produces exhaustion from loss of fluids. Splenic ascites. Malarial poisoning. Roaring in the ears; cold, clammy skin; indigestion; voracious hunger, yet rapid emaciation; characteristic undigested stool, etc.—COLCHICUM. Urine scanty, bloody, offensive. Skin dry and pale. Gastric derangements. He craves things, but cannot eat them when they are brought to him; he is nauseated when he smells the food, especially while it is being cooked. Vomiting after trying to eat, followed by great weakness.—DIGITALIS. Hepatic disease. Very scanty

urine, almost suppressed; attacks of faintness, seemingly proceeding from the heart; intermitting pulse; jaundice.—HELLEBORUS. Frequent, but scanty, urination; great thirst; weak, small, tremulous pulse; stools of jelly-like mucus.—KALI CARBONICUM in complication with affections of the liver and heart, with severe, sharp, stitching pains; flatulent indigestion; soreness in the liver from jaundice; no fever.—LYCOPodium in long-standing cases; malnutrition; patient thin, emaciated; in children who are wrinkled and prematurely old. Great despondency. Atonic dyspepsia, with acid indigestion and troublesome flatulency. Cirrhosis of the liver. Red, sandy sediment in the urine.—MERCURIUS. Often excellent when the liver is affected. Characteristic indications.

Consult also BRYONIA, HYDRASTIS, LACHESIS, NITRIC ACID, NUX VOMICA, PHOSPHORUS (cirrhosis of the liver), SULPHUR (engorgement of the liver), SQUILLA.

PART VII.

DISEASES OF THE RESPIRATORY
ORGANS.

PART VII.

Diseases of the Respiratory Organs.

DISEASES OF THE NOSE.

ACUTE NASAL CATARRH.

Acute nasal catarrh, acute coryza, acute catarrhal rhinitis, is a catarrhal inflammation of the nasal mucous membrane, usually extending into the sinuses and larynx. Its essential cause is probably a micro-organism. The affection is commonly brought on by sudden changes in temperature, chilling, getting the feet wet, and exposure to draughts. It is seen in the early stage of several acute diseases, as measles, small-pox, "la Grippe."

Symptoms.—Chilliness or shivering, with fulness in the head, slight fever, and discharge of a thin, watery character from the nose are the first indications of "a cold." There may be aching in the back and limbs, with moderate fever, a temperature of, usually, about 101°, quick pulse, dry and hot skin, and thirst. The nostrils are occluded, necessitating breathing through the mouth; the voice is nasal, and the patient complains of severe headache, in the forehead, over the eye-brows, when the sinuses are involved. Dryness and soreness in the pharynx and laryngeal cough, with huskiness or loss of voice, are not uncommon; extension into the Eustachian tubes gives rise to ear-ache and temporary dulness of hearing, and may cause permanent trouble in children who take cold often. The conjunctiva may be affected, with watery discharge from the eyes. The sense of smell is lost for the time being, and that of taste is impaired.

Labial and nasal herpes are frequent. The nasal discharge, after thirty-six or forty-eight hours, becomes thick, yellow, greenish, sometimes tinged with blood. It may be copious, possibly, but not always, with relief of the tormenting sense of nasal occlusion. Sometimes the frontal headache continues, but usually improvement begins soon after the nasal discharge has become thick; recovery occurs in a few days, the nasal discharge and cough disappearing gradually.

The diagnosis is easy, but the connection of catarrhal symptoms with epidemic influenza and measles must not be overlooked.

The prognosis is always favorable, with the possible exception of young infants and very old and feeble people, in whom there is danger of pneumonia.

Treatment.—Although acute coryza in itself is a trifling affection and often requires no treatment, its frequent recurrence is highly undesirable, and measures should be taken to prevent it. In children a process of “toughening” is advisable, if not carried too far. They should be out-of-doors in suitable weather, properly clad, but not overdressed. The feet must be kept warm and dry; the shoes heavily soled and the stockings of proper material; the neck must not be too warmly bundled, nor overcoats worn save when really necessary. The air of close, overheated rooms is highly injurious, and the proper ventilation of bed-rooms is of much importance. During an attack the patient should remain in-doors, and in bed if it is severe. A Turkish bath is often very useful, but must be taken with due precaution lest it result in additional cold. The bowels should be kept open and a light diet ordered. The inhalation of hot water in which hamamelis (Pond’s extract) has been dissolved frequently relieves the stuffiness. A spray of a four-per cent. solution of cocaine is very useful, given three or four times, at intervals of a few hours (menthol and cocaine, ten grains each, to one ounce of alboline) during the early stage of the attack. Cloths wrung out of very hot water applied to the forehead, or steaming the face, is very comforting when there is severe frontal headache from blocking of the sinuses; when these are used, the patient must remain in-doors for some little time. Camphor, a drop, or two, on sugar, is an old and valuable domestic remedy; it often breaks up an attack.

Therapeutics.—**ACONITE**. In children; from exposure to sudden change of temperature or wind. Chill, fever, sweat, headache, restlessness, sneezing, dry, hacking cough.—**GELSEMIUM**. Shivering and chilliness along the back, even during fever; headache, general, not localized; depression; soreness all over; nasal discharge thin, watery, non-irritating. Epidemic form.—**EUPHRASIA**. Involvement of the conjunctiva, with sensitiveness to light and acrid lachrymation; sneezing; nasal discharge non-irritating.—**SAMBUCUS**. “Snuffles” of infants; jumps up during sleep because it cannot breathe; threatening laryngeal involvement; copious sweating which stops when the child is sleeping.—**PULSATILLA**. After the first stage has passed; discharge thick, yellow, greenish; or alternation of fluid and of dry coryza; feels better in the open air; no thirst; chilliness.—**NUX VOMICA**. Coryza fluent during the day, dry at night; heavy pain in the forehead, over the eye-brows; shivering.—**ARSENICUM**. Especially useful in older people. Copious, watery, acrid coryza, irritating the nostrils and eyes. Feels cold all the time; wants heat applied externally; tearing, asthmatic cough.—**ARUM TRIPHYLLUM**. Coryza with copious, acrid, highly irritating discharge; the nose, in spite of abundant discharge, seems completely stopped; nostrils very sore, with constant desire to bore into the nose and pick it.—**AMMONIUM CARBON**. Acrid, watery coryza during the day; at night the nose is stopped up.—**ALLIUM CEPA**. Watery, acrid discharge from the nose; bland watery discharge from the eyes. Better in the open air. “Splitting” laryngeal cough.—**KALI BICHROM**. Nasal discharge tough, stringy. Heavy frontal headache, better from pressing upon the bridge of the nose.—**SANGUINARIA**. Acrid coryza with much sneezing; soreness and pain in the nose; loss of taste and smell; headache; shivering; sore and raw throat; hacking cough.—**KALI IODATUM**. Copious watery discharge from eyes and nose; yellowish-green discharge from the nose. Conjunctival irritation with free lachrymation; stitching pains in the ears; in scrofulous children.

CHRONIC NASAL CATARRH.

This may be simple, hypertrophic, or atrophic. *Simple* chronic rhinitis usually results from repeated attacks of acute coryza. The symptoms are similar, rather more unyielding,

and much aggravated during damp, "bad" weather. There is difficulty of breathing through the nose; sneezing; watery, later thick and yellowish or bloody, discharge from the nose; frontal headache; deafness and hoarseness.

The diagnosis is based upon the presence of these symptoms. "The anterior part of the lower turbinals can be pressed back with the probe; there is, too, a decided shrinkage of the tissues for a short time after the application of cocaine" (Quay).

Treatment consists largely of cleansing applications to the nasal mucous membrane. This may be accomplished by the use of various atomizers or by the post-nasal syringe. After receiving treatment the patient must not be allowed to use the handkerchief for at least fifteen minutes nor go into the open air. If the air condenser is used, it must be kept under low pressure. For cleansing, Seiler's tablets, Listerine or a solution of bicarbonate of soda in water may be employed. The use of sulphate of zinc (gr. 1 to water, one ounce), muriate of hydrastin (gr. 1 to water, one ounce), boric acid (grs. x to water, one ounce), or menthol crystals (grs. x to alboline, one ounce) in the form of nasal spray is also beneficial.

Therapeutics.—AMMON. MURIATIC., ARSEN. IODAT., CALCAREA CARBON., CALCAREA PHOSPHORICA, ALLIUM CEPA, FERRUM IODAT., HEPAR, HYDRASTIS, KALI BICHROM., KALI IODAT., MERCURIUS IODAT., NATRUM ARSEN., NATRUM CARBON., NATRUM MURIAT., PULSATILLA, SANGUINARIA, STICTA, THERIDION. For special indications see close of chapter.

Hypertrophic rhinitis is usually a sequel of the simple form. Its distinctive pathological features consist of thickening of the tissues, swelling of the mucosa of the septum, and enlargement of the turbinated bodies, chiefly of the free borders of the middle and lower. Hypertrophy of the adenoid tissues in the pharyngeal vault is often present. The principal symptom produced is difficulty of breathing through the nose, with establishment of "mouth-breathing." There is also impairment of the sense of smell and of taste; frontal headache, periodical and of a neuralgic character; hardness of hearing, with tinnitus; dropping of mucus into the throat; laryngeal involvement, with hoarseness and cough and asthmatic breathing. In children mouth-breathing produces a characteristic expression of the face, mental dulness, and a noticeable change in the shape of the chest.

Treatment is largely surgical, and should be directed by an experienced specialist. The indications are: cleansing of the parts (bicarbonate of soda, grs. 90; listerine, six drachms; water, one ounce), the removal of the growths, and the reduction of the hypertrophied mucous membrane.

Consult AMMON. CHLORAT., ARSENIC. IODAT., FERRUM IODAT., MERCUR. SOL., SILICA.

Atrophic rhinitis, dry catarrh, fetid catarrh, consists of dryness of the nasal mucous membrane with atrophy and destruction of the glands and follicles. It may result from the hypertrophic form of nasal catarrh, but its ætiology is very uncertain, save that scrofulous and syphilitic disease is probably closely related to it. Ozæna is frequently present in these cases, as it may be in other conditions (caries and necrosis of bone, foreign bodies, glanders, etc.). It is oftener seen in young persons, especially those of low vitality and depraved health.

Pathologically there is atrophy of the epithelium, with destruction of the glands, granulation and necrosis, and formation of green, brown, or bloody crusts composed of mucus, pus, epithelium, fibrin, serum and mucin, with slight underlying erosion, but not ulceration, characterized by an intensely offensive odor from the nose. The latter constitutes the most distinctive symptom of the disease. The sense of smell is impaired and soon lost. Nasal respiration is free, but a sense of discomfort and dryness in the nose is felt and leads to frequent boring in the nose. The scabs are dislodged with difficulty. Epistaxis is frequent from attempts to remove the scabs. Implication of the pharynx (pharyngitis sicca) is not uncommon. General health rarely suffers materially. "Saddle-back" nose is associated with the affection.

The prognosis is favorable, though absolute cure exceptional; fixed ozæna may remain.

Treatment.—Cleanliness is of first importance. Ivin recommends the use of a warm solution of salt (10 grains) and bicarbonate of soda (10 grains) in water (four ounces) by post-nasal syringe or a spray of vaseline or alboline. The scab removed, the eroded surface must be treated with boric acid, iodol or aristol directly applied by insufflation. A 10-per cent. solution of menthol in alboline is highly beneficial; also insufflation of the first or second decimal trituration of permanganate of

potash. It is said that the applications, to be beneficial, must be often changed. The treatment, however, practically belongs to the specialist. Remedies likely to prove useful are: ALUMINA, ARSEN. IODAT., AURUM, CALCAR. CARBON., GRAPHITES, HEPAR, KALI CARBONIC., KALI BICHROMICUM, MERCURIUS CORROS., NITRIC ACID, PSORINUM, PULSATILLA, SEPIA, SILICA, THERIDIUM, THUJA.

Therapeutics of Chronic Nasal Catarrh.—ALUMINA. Simple catarrh of old people; of elderly women who suffer much from leucorrhœa; chronic constipation. Atrophic form: nose swollen, sore; septum ulcerated; discharge greenish, yellow, bloody.—AMMONIUM MURIATICUM. Clear, acrid, watery nasal discharge, corroding the lips; constant itching in the nose, with desire to blow; hoarseness and burning in the larynx.—AMMON. CHLOR. Recommended by Ivins when there is hypertrophy, chiefly of the septum.—ARSENICUM IODAT. Simple form, with burning, acrid discharge, predisposition to take cold, and asthmatic complications. In the hypertrophic form, with granulation of the soft parts, thick yellow discharge, glandular swellings. Atrophy, with profuse thick, yellow discharge; ozæna in scrofulous subjects.—AURUM. Scrofulous, mercurial, syphilitic ozæna. Nasal bones sore, ulcerated; bones of nose and face sore to pressure. Excessive fœtor of the discharges. Melancholia.—CALCAREA CARBONICA. Characteristic temperament, indigestion, and innutrition. Glandular swellings, especially in the neck. Offensive smell in the nose, as from rotten eggs. Breathing obstructed only at night. Discharge thick and fetid. Ozæna with corroding, foul-looking discharge. Ulceration of the septum. Hoarseness.—CALCAREA PHOSPHORICA. Especially useful in anæmic subjects, with adenoid vegetations and nasal mucous polypi. Pallor and relaxation of the soft parts.—ALLIUM CEPA. Useful in chronic cases of simple catarrh, with dropping of clear, watery discharge into the throat. The nasal obstruction gets worse the moment he enters a warm room.—FERRUM IODATUM. In anæmic persons, suffering from malnutrition; relaxed and pale mucosa. Adenoid vegetations. Follicular pharyngitis.—GRAPHITES. In large persons of phlegmatic temperament, with eczematous trouble, especially behind the ears, and who take cold easily. Nostrils ulcerated; ozæna.—HEPAR. In the simple form. Patient takes

cold easily, from the slightest current of air. In case of suppressed eruptions. Copious, purulent, stringy discharge. Hard swelling of the tonsils and (anterior) cervical glands. In ozæna: symptoms like those of MERCURY, which MERCURY fails to relieve. Bones of nose sensitive to pressure or touch. Face of a dirty, yellow, unhealthy color.—HYDRASTIS. Nose raw, sore; air feels cold in the nose. Frontal headache. Copious thick, white, yellow, tenacious discharge.—KALI BICHROMICUM. More useful in the atrophic than in the simple form. Great dryness of the nose. Severe pain across the bridge of the nose. Involvement of the frontal sinuses and naso-pharynx. Thick, offensive, lumpy, ropy discharge, sometimes blood-stained, from the nose and throat.—KALI IODATUM. In simple catarrh, with attacks of chilliness and heat, involvement of the ear, sneezing, acrid watery discharge; the latter sometimes stops, and then there is much headache over the eye-brows. In ozæna, with syphilitic history, ulceration of the septum, throbbing and burning in the nose; thick, greenish-yellow, excoriating discharge; otorrhœa.—MERCURIUS CORROSIVUS. Ozæna. Acrid discharge from the nose, causing burning, smarting pain; glue-like discharges, running into the naso-pharynx, and there forming scabs.—MERCURIUS IODATUS. Discharges whitish-yellow or greenish, fetid or corrosive; glandular involvement, enlarged tonsils. Characteristic constitutional symptoms.—NATRUM ARSEN. Burning watery discharge from the eyes, with supra-orbital headache. Sensation constantly as though the nose were stopped up; pain in the root of the nose.—NATRUM CARBONICUM. Worse from every draught of air; discharge thick, yellow, irritating, excoriating lips and nose. Eczema, acne, erythema of the nose; nose red and sore to touch.—NATRUM MURIATICUM. Great sensitiveness to cold or heat; frequent sneezing; nose "runs" all the time, especially as soon as he steps into the open air. Loss of smell. Fever-blisters about the mouth.—NITRIC ACID. Syphilitic ozæna; after abuse of mercury. Dryness of nose and throat. Nose bleeds when touched.—PSORINUM. Acrid, ichorous discharge. Horrible fœtor.—PULSATILLA. In simple catarrh with abundant heavy yellow or greenish, bland discharge, with loss of taste and smell, aggravations in the warm room, chilliness, and characteristic mental symptoms. Also given in ozæna, when the dis-

charge often changes in color and consistency.—**SANGUINARIA.** Simple catarrh, with burning in the nostrils, pain in the root of the nose and frontal sinuses; pain in the temples; rawness of the throat; sharp, hard, dry cough, sometimes almost convulsive, and discharge of thin, watery, acrid fluid from the nose.—**SEPIA** is highly recommended when there is “yellow or greenish crusts or plugs discharged through the anterior nares, and a gnawing pain or pressure at the bridge of the nose.”—**SILICA.** Deep-seated destruction of the parts with painful dryness or copious purulent excoriating discharge; itching of the tip of the nose; throat dry and painful. Ulceration of deep structures.—**STICTA PULMONARIA.** Profuse discharge of bloody pus; distressing cough and oppression of the chest. Dryness of the nose and palate; they feel as stiff as leather, with occasional discharge of scabby mucus, worse in the evening and at night. Catarrh, with constant blowing of the nose, but no discharge.—**THERIDION.** Offensive greenish-yellow discharge; cases complicated with bronchial or pulmonary catarrh. Feeling of fullness or pressure at the bridge of the nose. Crusts form, are drawn into the throat, and expectorated.—**THUJA.** “Nasal catarrh, with quantities of thick, green mucus, pus and blood, that seem to come from the frontal sinuses. Painful scabs in the nostrils. Warts on the nose” (T. F. Allen).

HAY FEVER.

Hay fever, autumnal catarrh, pollen catarrh, rose cold, periodical hyperæsthetic rhinitis, is an affection of the upper air passages, with asthmatic tendency, which is observed at certain seasons of the year, in the eastern and middle states from the month of June to the appearance of the first severe frost, which puts an end to the trouble. It is seen oftener in males than in females, rarely before the tenth year or, as a first attack, later than the twenty-fifth year.

Ætiology—The chief factors are: The presence in the air of certain substances which irritate the nasal mucous membrane, principally the pollen of some plants, which may be carried great distances. An irritable condition of the nasal mucous membrane; the cure of a local disease may result in the cure of hay-fever. A neurotic temperament; this shows itself in the

liability to hay-fever from causes which otherwise would prove harmless. Heredity plays an important part. Persons of sedentary occupation are said to fall easy victims. It is more common in America than in Europe.

Symptoms.—Weariness and lassitude often precede the attack. An acute catarrh gradually develops, with paroxysms of sneezing, followed by copious watery discharge from the nose, congestion of the eyes with abundant secretion of tears, and often considerable dryness and smarting in the roof of the mouth. These symptoms often are severe and distressing. The discharge from eyes and nose is irritating, and the swollen condition of the mucous membrane of the nose renders breathing difficult or even impossible. Headache may be very severe, and in some cases there is much shivering and slight, irregular fever. The patient soon begins to cough; there are all the symptoms of an acute bronchial catarrh, with paroxysms of asthma. The affection has many features which render it very unpleasant and trying, and is not readily amenable to treatment at home; under these circumstances, and in view of the neurotic element so commonly present, it cannot be a source of surprise that its yearly visitations are productive of mental depression bordering upon despair.

The diagnosis is not difficult. It is a *summer*-disease, not brought on by conditions of weather which cause catarrh; nor does the discharge after a time assume the thick, semi-purulent character which is a feature of catarrh; the history of its appearance and disappearance also is striking.

Treatment.—This comprises, first of all, the removal of abnormal states of the nasal mucous membrane, including the destruction by the galvano-cautery of the so-called "sensitive areas" and the reduction of infiltration or hypertrophy of the turbinated bodies. Proper attention must be paid to existing disturbances of the nervous system. Finally, in addition to appropriate medication, the patient should have the benefit of a temporary sojourn in some favorable locality during the months of danger.

The United States Hay Fever Association have for many years studied the climatic feature of the treatment, without, so far, quite solving the problem. It is stated that the inhabitants of cities of the Atlantic sea-coast and of the central states

enjoy complete immunity in the Adirondacks and White Mountains. From personal observation and from intimate knowledge of a very large number of such cases I believe that Put-in-Bay, on the shores of Lake Erie, and Petoskey, Michigan, on Little Traverse Bay (Lake Michigan) offer equal advantages. Often a sea-voyage answers the purpose, but the offending pollen can travel immense distances and may find an unlucky victim when least expected.

Therapeutics.—The remedies under acute and chronic catarrh must be carefully studied. The following are especially useful: **ARSENICUM IODAT.** Much prostration; tendency to asthma; pallor of the face; irritating character of the nasal discharges; great sensitiveness of smell; burning dryness in the larynx, with paroxysmal, suffocating cough, especially at night, with asthma (worse after midnight) and scanty expectoration.—**ALLIUM CEPA.** Thin, watery, excoriating discharge from the nose; congestion of the eyes, with redness of the eye-balls and copious bland lachrymation; severe hoarseness; tearing cough, with a sensation as if the throat would split to pieces.—**EUPHRASIA.** Symptoms of influenza. Catarrhal irritation of the conjunctiva, with free discharge from the eyes; soreness of the lids from the acidity of the discharge. Sneezing, with copious discharge of bland, watery mucus from the nose. Cough, dry and tickling, sometimes with free expectoration, throughout the day, but stopping at night.—**GELSEMIUM.** Great exhaustion. Feels chilly and feverish, as though malarious. Takes cold easily. Characteristic head symptoms.—**NAPHTHALINE.** Enjoys an extensive reputation and is by many considered almost a specific. It must be given in the low triturations (1x or 2x). Its special indication is the severity of the asthma. There is much sneezing; the eyes are inflamed and painful, the head hot, severe spasmodic bronchial cough, with asthma; soreness in the chest and feeling of tightness about the stomach, obliging him to loosen his clothing. Better in the open air.—**SABADILLA.** Violent spasmodic sneezing and lachrymation while in the open air; burning, itching, tingling in the nose; the nose is swollen, and there is watery discharge from it. Hoarseness; dry short cough at night; wheezing in the trachea when lying down.

EPISTAXIS.

Nose-bleed results from injuries to the nasal mucous membrane by picking at the nose, from blows or other traumatism. It is common in nasal catarrh. It may be an effect of serious injury to the skull (fractures). It is of frequent occurrence in full-blooded, plethoric young persons, especially about the period of adolescence, preceded by fulness of the head and flushing of the face. It is also seen in connection with hæmophilia, chronic anæmia, and in the early stage of some fevers, as typhoid fever. Vicarious nose-bleed occurs in suppressed menstruation. The nose-bleed which is a common effect of ascending into a high altitude is in no sense pathological. The bleeding may take place from one or both nostrils; it is caused by capillary oozing or diapedes.

There are no symptoms save the loss of blood, which in exceptionally bad cases may give rise to exhaustion and anæmia.

The diagnosis is easy; if blood from the posterior nares should find its way into the throat and be swallowed, bleeding from the lungs or stomach might be suspected.

Treatment.—Treatment is rarely necessary, the bleeding almost always stopping of its own accord by clotting. Postural treatment, by holding the arms above the head, and the injection of ice-water or of hot water into the nostril, are usually all-sufficient. If the hæmorrhage occurs from the lower portion of the septum, about half an inch from the nasal opening, firm outside pressure will arrest it. Lemon-juice locally applied, cob-webs introduced into the nostril, or astringents (tannic acid, zinc, alum) applied on a pledget of cotton or injected, are efficient common remedies. Tamponing (antipyrine, ergot, rarely peroxide of iron) may be necessary when the hæmorrhage follows an operation; if so, the tampon must be firmly placed and be allowed to remain at least for twenty-four hours, not to be removed until previously softened by a warm injection. If from an ulcer, apply chromic acid or cauterize. Tamponing is the last resort in bleeding from the posterior nares when other methods fail. "A soft rubber catheter can be utilized. Through the lumen of the catheter a strong string or cat-gut (about two feet in length) is passed. When the instrument is carried through the nostril into the pharynx, the end of

the string is seized with forceps and brought out of the mouth. The tampon is then firmly tied to the middle of the string, and the plug pulled up behind the soft palate and into the nostril. The two strings are now tied firmly over the upper lip. It is always necessary to hold the soft palate forward with the index finger, so as to permit the tampon to pass behind it. The tampon should be removed in from twenty-four to forty-eight hours" (Quay).

When the bleeding depends upon constitutional causes, the remedy indicated by the totality of symptoms must be exhibited.

DISEASES OF THE LARYNX.

ACUTE LARYNGITIS.

Ætiology.—Acute laryngitis occurs as an independent affection or in connection with catarrhal inflammation of the nasopharynx or bronchi. It is usually the result of taking cold or of "straining" the larynx by unwise or violent use of the voice, as talking too loud, shouting, excessive use of the vocal organs in public speaking, especially in badly ventilated rooms. Other common causes are: irritation of the throat, as from inhaling smoke or irritating gases; direct, local action of corrosive substances or very hot liquids; less frequently, traumatism, as from external violence or the presence of a foreign body in the throat. The affection is often seen in connection with measles, influenza, scarlet fever, typhoid and erysipelas. It is most prevalent in the damp, cold months of winter and early spring.

Symptomatology.—Some cases begin with the symptoms of an acute coryza; in others, annoying dryness of the throat, with tickling in the larynx, sensitiveness to inspired cold air, and dry harsh cough set in at once. The cough is characteristic in that it possesses a dry, hard, metallic quality which is readily recognized, and is even by the laity described as "laryngeal." There is at first slight, if any, expectoration; later scanty expectoration of glairy mucus takes place, which becomes mucopurulent and sometimes blood-streaked, but never

copious. The voice is husky, even early in the course of the affection, then becomes hoarse, and may be completely lost; considerable pain is provoked by attempts to use it. There is more or less laryngeal tenderness to external pressure and pain upon inspiration. Some dyspnoea, depending upon oedema of the parts, is not infrequently observed in adults; generally speaking dyspnoea is not a conspicuous symptom, save as seen in the spasmodic form of children. Slight fever, lassitude and headache may be present. If the case is one of unusual severity, the cough may be very violent and accompanied with much pain, difficult swallowing and pronounced dyspnoea.

Examination of the parts with the laryngoscope reveals a swollen and tumefied laryngeal mucosa, especially about the ary-epiglottidean folds, swelling and redness of the vocal cords, with infiltration of the adjacent mucosa and muscular structures, interfering with the free action of the vocal cords and preventing their approximation during phonation. The parts are covered with a thin coating of mucus. Superficial erosions, especially on the cords, are seen in severe cases.

The disease runs a favorable course in a few days to a week or ten days. Recovery may be imperfect, resulting in chronic laryngitis.

Diagnosis.—The laryngoscope establishes the diagnosis, though the mirror often cannot be used satisfactorily in children. The character of the cough, the alterations in the quality of the voice, and the progressive nature of the disease are usually sufficient. Exceptional cases will be pointed out hereafter.

Treatment.—The patient should be kept in bed. The temperature of the room should be maintained at 70°, and the atmosphere saturated with moisture. The use of the voice must be prohibited; unavoidable talking must be done in a whisper. The external application of ice to the throat (ice bags) is recommended, but its advantages in the average case seem doubtful. Soothing sprays are often very comforting.

Therapeutics.—*ACONITE* is the most important remedy in the beginning, and often all-sufficient.—*BELLADONNA* ranks next in usefulness, also early. There is considerable arterial excitement, flushed face, vivid redness of the larynx and throat, constrictive dryness and sensation of dust in the larynx, provoking

tickling and coughing; painful swallowing.—BROMINE. Cough sounds croupy; larynx feels raw and "scraped." In exceptional cases only.—CALCAREA IODATA. "An admirable remedy when there is rawness, burning, soreness and tenderness of the larynx, with frequent cough, hoarse and barking, and a sensation of tightness and constriction. Dissolve five grains of the crude drug in half a glass of water, and give a teaspoonful every half hour" (Hale).—FERRUM PHOSPHORICUM. Like ACONITE, in the early stage, with practically the same indications without its fever, restlessness and anxiety. Highly recommended by Ivins, Houghton, and other specialists.—GUAIACUM. Burning sensation in the larynx; sticking pain from the larynx to the left clavicle; frequent dry cough, with hacking and hawking, and scanty expectoration of mucus. "Rheumatic cases." The bands are boggy, and there is loss of tone and lustre. C. M. Thomas uses a spray of one drachm of the ammoniated tincture to one ounce of water.—HEPAR SULPH. Hoarseness; deep, harsh voice; barking, croupy cough; very sensitive to even slight draught. Considerable dyspnœa. Rattling of mucus in the larynx. In children.—IODUM. Soreness of larynx to touch; cough dry, harsh, croupy; watery discharge from the nose.—PHOSPHORUS. Constant dry, hacking cough, at times with much tickling in the throat; the larynx feels sore and rough; cough and laryngeal soreness increased by laughing, talking, swallowing, and change from warm to cool air. Expectoration scanty, sometimes blood-streaked.—SANGUINARIA. Soreness, dryness and swelling of the larynx; dry cough, with tickling in the throat-pit and crawling extending beneath the sternum. Great dyspnœa, respiration sawing or rasping, worse from lying down. Scanty glairy expectoration.—SPONGIA. Shrill, barking, dry croupy cough, sometimes with scanty, tenacious expectoration. Dyspnœa. Spasmodic cough. Labored, wheezing inspiration.

Under the term "*Submucous laryngitis*" a severe but rare form of acute laryngitis is described which involves the deep tissues, causing serous or bloody infiltration, with resultant narrowing of the larynx. The ætiology is that of the common acute form, which it also resembles in the symptoms. There is, however, a pronounced sense of laryngeal fulness and swelling, with more painful deglutition and more annoying dyspnœa.

Pain is a conspicuous symptom, aggravated by coughing, swallowing, talking, breathing and external pressure. There is often considerable fever, with a temperature of 102° to 104° F. The respiratory embarrassment may become extreme, and death may result from suffocation or blood deterioration.

The diagnosis can only be made positively by the use of the mirror.

The prognosis is grave, some cases proving fatal within twenty-four hours.

The treatment consists of rest in bed, absolute interdiction of the use of the voice, inhalation of moist air (steam), and the employment of menthol, eucalyptol or lime-water spray. Tannic acid, in steam, may aid in reducing the infiltration. A four per cent. cocaine spray and heat applied externally often relieve the pain. Scarification, intubation or tracheotomy may become necessary. The remedies most serviceable are: APIS, ACONITE, BELLADONNA (see oedematous laryngitis).

Laryngitis Stridulus, spasmodic or false croup, is an acute laryngitis which occurs in children, usually during the period of first dentition, oftenest in the second and third year of life, not usually after the fifth year. In rare cases it is seen up to the age of adolescence and, very exceptionally, even in adult life. The distinctive feature of this type consists of paroxysms of difficult inspiration, with a sense of impending suffocation, commonly occurring in the middle of the night. The child has the symptoms of a moderate laryngitis, with the usual indisposition and occasionally dry, metallic cough, possibly slight fever, but retires and goes to sleep feeling fairly well. In the night, oftenest about midnight, the patient suddenly and with a start awakens from sound sleep, unable to "get his breath." The inspiratory effort is prolonged and intense, accompanied with a shrill stridulous sound. The appearance and actions of the child manifest the distressing sense of impending suffocation. The face is distorted, expressing terror; the pulse is rapid and small; the upper chest is violently drawn in from the great muscular effort made, causing a marked recession in the supra-sternal and supra-clavicular spaces; the voice is hoarse, and the frequent cough sounds harsh, metallic, "croupy;" the lips and tips of the fingers often become cyanotic. The paroxysm having passed off, the child will probably

fall asleep and rest until morning, but occasionally recurrences take place. This usually is repeated on the second, rarely the third, night, the intervening days being passed quietly enough, except that there is harsh cough and other symptoms of laryngitis.

The peculiar tendency on part of children to this striking manifestation depends largely upon the narrowness of the larynx of childhood, which is seriously accentuated by even moderate swelling of the mucous membrane, upon the accumulation of mucous secretion, and reflex spasm of the glottis. It is not, in the present case, of purely nervous origin. No special anatomical features, save those of simple catarrh, have been observed.

The diagnosis, in spite of the pronounced character of the symptoms, is not always easy, since laryngismus stridulus and membranous laryngitis present a close similarity. *Laryngismus stridulus*, however, has no history of catarrhal involvement, no hoarseness or aphonia, and very slight fever; the attacks do not come on at night, and they pass off with a prolonged crowing respiration. *Pseudo-membranous croup* not only has much more profound constitutional disturbances, but often exudation on the tonsils and adjacent parts, with enlargement of the cervical glands. The course of the disease differs in that it is continuous and lacks the nightly occurrence of the paroxysms, the freedom from annoyance during the day, and the probable cessation of the seizures after the third night.

Treatment.—The arrest of the paroxysms is the first care. To this end a hot bath or the immediate application to the throat of a sponge dipped in hot water is highly useful. An emetic (zinc or ipecacuanha) promptly administered answers the same purpose. Wrapping the throat in a piece of flannel dipped in kerosene is a common domestic remedy of efficiency. If necessary, a few whiffs of chloroform may be inhaled. The physician should assure the mother, especially if young and inexperienced, of the entire absence of danger.

Therapeutics.—ACONITE and SPONGIA, given in the low attenuations and at frequent intervals, almost always quickly control the paroxysms. After this has been accomplished, the further exhibition of the indicated remedy (see acute laryngitis) will usually bring about quick recovery and often prevent recurrence of the attack on the second or third night.

Persons, especially children, subject to laryngitis, should be careful to avoid exposure to cold and overuse of the voice, and must dress properly. The throat must not be bundled up too closely. Long-continued daily bathing of the throat in tepid and cold water tends to "harden" it.

CHRONIC LARYNGITIS.

Ætiology.—Attacks of acute laryngitis, especially when frequent, may be followed by the chronic form. Irritation of the throat from overuse of the voice, the tobacco-habit, or living in an atmosphere saturated with tobacco smoke or tobacco dust, the alcohol habit, and the existence of post-nasal catarrh, are other important causes. The latter is operative in very many cases, the nasal obstruction establishing mouth-breathing, or the catarrhal process affecting the vocal organs by continuity of structures or by coming in contact with the foul discharge from the naso-pharynx.

Symptoms.—The most constant symptom consists of changes in the timber of the voice. It grows rough, hoarse, unsteady and unreliable in speaking or singing; sudden loss of control is common, even to complete stopping, from bits of mucus which drop between the vocal bands. At times the voice, hoarse and unsteady at first, clears up from use, and remains so until fatigued. Its range becomes restricted, a source of much distress to singers. During the dry months of the year this symptom may be quiescent, but shows itself promptly upon the appearance of damp weather. Cough is dry, hacking, harsh, usually provoked by tickling in the throat, worse during damp, cold weather, and followed by expectoration which generally is slight, lumpy or ropy, of varying color and consistency. Exceptionally it is copious. There is often present a desire to constantly clear the throat, which may become a fixed habit, sure to aggravate the local irritation. Rawness and dryness in the throat are persistent. The mirror shows swelling of the mucosa, which, however, lacks the intense redness of the acute inflammation. The symptoms are often modified by the existence of other affections of which the laryngitis happens to be a sequel or complication.

The *course* of the affection is tedious. While not immediately

dangerous to life, it may, especially in persons inclined to tuberculous disease, become a factor of serious importance; hence, every effort should be made to cure it.

Treatment.—Experienced specialists, in addition to the cure of possibly existing nasal or naso-pharyngeal catarrh, lay much stress upon the necessity of teaching the patient a proper method of vocalizing, employing for this purpose, when possible, a competent teacher of the voice. Ivins lays down the following excellent rules: Sing or speak as little as possible when hoarse. Always pitch the voice low in conversation. Always sing with as little exertion as possible. Never sing higher than the easy compass of the voice, as nothing will be gained and much harm may result. Avoid straining the muscles of the pharynx in speaking or singing. Always breathe through the nose. Whatever irritates the larynx, as smoking, must be interdicted, and, if possible, exposure to dust or foul air is to be avoided. The general health must be energetically cared for, including the use of proper underwear, bathing, etc. A change of climate from the seaside inland, or vice versa, is often beneficial, even essential.

Local treatment consist of measures for cleansing the parts (alkaline sprays, borax in solution of four grains to the ounce of water, Seiler's solution, permanganate of potassium), followed by stimulating applications, as chlorate of potassium, sulphate of zinc, or silver nitrate, the parts being carefully dried before using the latter. Peroxide of hydrogen, one part to three of water, is indicated when there is profuse secretion. Astringent applications (tannic acid, 5 grains to one ounce of glycerin) are beneficial when the mucous membrane is relaxed and "sluggish." The sprays or direct application by means of a laryngeal probe may be used with proper precautions. When possible, these cases should be sent to a specialist.

Therapeutics.—Of the long list of remedies recommended, ARGENT. NITR., HEPAR SULPH., IODUM, KALI BICHROM., PHOSPHORUS and GELSEMIUM are the most useful.—ARGENTUM NITRICUM. "Inflammation and swelling of the posterior wall and lining of the larynx, attended by a sensation of a clog in the vocal organ, with hoarseness or loss of voice, continual and vain efforts to swallow, with pain and soreness in deglutition, much hawking with considerable muco-purulent expectoration

or titillation in the larynx, with dry spasmodic cough" (Meyhoffer). Public speakers and singers.—**ARSENICUM ALBUM.** Dryness and burning, with sensitiveness of the larynx. Voice husky, without volume, easily tired out. Local anæmia. Paroxysms of coughing, with scanty expectoration and asthmatic tendency. Irritability, weakness, nervousness. (ARS. IOD. has of late years been extensively used.)—**CALCAREA CARBONICA.** Involvement of the upper larynx. Hoarse cough. Discharge of thick, jelly-like mucus from larynx and naso-pharynx. The throat looks bluish from dilatation of veins; raw feeling in the larynx; voice weak. Characteristic temperament; great dyspnœa from going up-stairs. (CALC. IOD.?)—**CARBO VEGETABILIS.** Laryngeal rawness and soreness in old people; painless dryness, with aphonia in the evening. Burning pain from coughing. Venous capillary dilatation of the pharynx and larynx.—**CAUSTICUM.** Hoarseness and loss of voice in singers and speakers. Paralysis of the vocal cords. Cough with scanty expectoration and sensation "as if he could not get under the mucus to raise it;" constant dry, hacking cough, with involuntary micturition. "Mucous lining anæmic; vocal bands gray or dingy in appearance, and are seen to come in contact, but separate before a tone is produced, the muscles being so weak that the respiratory current forces the muscles asunder" (Ivins).—**HEPAR SULPHURIS.** Soreness and pain when talking or coughing; sensitiveness to cold air; hoarseness; loose, rattling mucus in the throat, with whistling sound in the larynx when he is lying down. Difficult expulsion of tenacious, scanty muco-purulent matter.—**IODUM.** Soreness of the larynx to touch; soreness of the larynx at one particular spot; dry, harsh cough, with expectoration of scanty, sticky lumps of mucus.—**KALI BICHROMICUM.** Tenacious expectoration. "Scanty stringy expectoration, which can sometimes be seen stretching across the glottis from band to band. I have rarely seen failure when this symptom was present" (Ivins). Varicose veins in the larynx.—**KALI IODAT.** Raw, sore pain as if larynx were granulated. Scrofulous and syphilitic cases.—**MANGANUM.** Highly recommended, in the low triturations, by Meyhoffer. "Dryness and tickling in the larynx; hoarseness and loss of voice, the attempt to clear the larynx causing a sensation of rawness and sometimes stitches; particularly valua-

ble for anæmic persons who are predisposed to catarrhal troubles. Expectoration scanty and tough; cough worse from reading aloud, with dryness and rawness in the larynx. Copious accumulation of mucus; roughness of the voice." (T. F. Allen).—MERCURIUS. Hoarseness; nocturnal cough, worse from lying on the right side. Swollen, livid appearance of the mucous membrane.—PHOSPHORUS. Larynx sore, dry, so sensitive that talking is painful. Aphonia. Cough hoarse, with scanty expectoration. (Acts best in the higher attenuations).—RUMEX CRISPUS. Aphonia. Incessant dry cough, which seems to come from the pit of the throat, from taking a deep breath, worse from inspiring cold air.—SANGUINARIA. Cough at night, with expectoration of offensive, thick mucus, sometimes tinged with blood. Dryness and swelling of the larynx. Loss of voice. Swallowing often painful.—SELENIUM. Paralysis of the vocal cords, hoarseness from singing or talking. Very valuable for the hoarseness of singers, especially when it is frequently necessary to clear the throat of clear, starchy mucus. Recommended by T. F. Allen, Meyhoffer, J. S. Mitchell, and others.—SENEGA. "Loss of voice in singers, with severe burning and hawking. Catarrh of the larynx; the voice is very unsteady, and the vocal cords are partially paralyzed; sometimes expectoration of tough mucus. Cough before breakfast" (T. F. Allen). Frequently clears the throat on account of colorless, starchy mucus.—SULPHUR. Aphonia; cough dry, worse at night, after lying down; asthmatic tendency; fatigue from talking.

ŒDEMATOUS LARYNGITIS.

Acute laryngeal œdema or œdema of the glottis is a very serious affection, rapid in its development, and often fatal. It occurs in connection with acute or chronic inflammation of tissues adjacent to the glottis (acute laryngitis, syphilitic and tubercular laryngitis, cellulitis, erysipelas of the neck, diphtheria, etc.), in certain infectious diseases (scarlatina, enteric fever, typhoid fever), or in connection with affections liable to cause dropsy elsewhere (acute or chronic albuminuria). Its *pathological* features consist of extensive, pale swelling of the epiglottis, the infiltration being prominent in the ary-epiglotti-

dean folds, which may meet in the middle line. The pallor of the swelling is not pronounced in the presence of intensely inflammatory conditions of the larynx. The œdema is in the majority of cases easily detected by the use of the mirror or it may be seen without the mirror if the tongue is strongly depressed; it may also be felt by the finger.

The symptoms are rapidly increasing difficulty of breathing, accompanied with shrill stridulous sounds, loss of voice, rapid small pulse, cold sweat, and frantic efforts to get breath. If the case improves, the distressing symptoms lessen in intensity, cough is followed by expectoration, and the patient drops into a refreshing sleep. No improvement taking place, death occurs from suffocation.

The diagnosis is easily made.

The prognosis is especially unfavorable when the œdema involves the parts below the glottis, in which event the case may terminate fatally within a few hours after the appearance of the first symptoms.

Treatment consists of ice applied to the neck and taken in the mouth; leeches may sometimes be used advantageously; oil of mustard and other irritants are advised. The atmosphere of the room should be charged with moisture and be kept at about 70° F. Steam inhalations may be employed, for a few minutes at a time, with precautions not to scald the throat. A 4 per cent. cocaine spray upon the œdematous structures often affords relief. Tannic acid, in a strong aqueous solution of the glycerole, is also serviceable. Insufflations of dry powders, for evident reasons, are objectionable. However, not much time must be lost in using these mild measures. Unless improvement appears promptly, the parts must be scarified; this trivial operation, by rupturing and emptying the sac, frequently gives immediate relief; it may become necessary to repeat it. Intubation or tracheotomy may have to be performed; if the latter, the operation must not be too long delayed.—**APIs** is the most important remedy when "the œdema occurs suddenly as a complication or sequence of burns or acute disease," for example erysipelas and the eruptive fevers. Parts glossy; stinging pains.—**ARSENICUM**. When associated with general anasarca, cardiac affections, Bright's disease, etc. Low state.—**LACHESIS**. In albuminuria.—**KALI IOD.** in syphilitic cases.—

SANGUINARIA, according to T. F. Allen, with sawing or rasping respiration, aphonia, dry and harsh cough, worse from lying down, scanty glairy expectoration.

LARYNGISMUS STRIDULUS.

This affection, still erroneously called thymic asthma and spasmodic croup, occurs in early childhood, hardly ever before the sixth month and rarely after the third year. It consists of spasmodic closure of the glottis (spasm of the adductor muscles), sometimes with spasmodic action of the diaphragm and other muscles of respiration.

It is now generally admitted that the disease is of nervous origin, probable reflex from peripheral irritation. It is oftenest seen in puny, rickety infants, and in those subject to tetany. When there is a marked predisposition, trifles act as exciting causes of an attack; thus, a scolding or slight punishment, or a fit of indigestion, or crying, are quite sufficient to throw the child into a severe paroxysm. In other cases they come on at night, without apparent provocation. The neurotic character of the trouble is not always understood by those in charge of the child, and the seizures are not infrequently treated as exhibitions of "temper." It is well to bear in mind the absence of any inflammatory action in the larynx and, hence, the inappropriateness of here using the term "croup."

Symptoms.—In the majority of cases no premonitory symptoms are observed. If any warning is given, it is usually by a few "catches" in breathing; but there are no catarrhal symptoms, hoarseness or cough, such as precede an attack of croup. There is simply a sudden and complete arrest of respiration, with struggling for breath, fixation of the muscles of the chest, and pallor, quickly followed by blueness of the face; twitching of the face and carpo-pedal spasms are common; a violent bending backward of the body, closely resembling opisthotonos, is not infrequent; general convulsions appear in exceptional cases. Cyanosis develops rapidly, and with it brings relief of the spasm, the seizure ending with increasing relaxation of the glottis and the somewhat labored inflation of the lungs with air, producing a characteristic prolonged, high-

pitched, crowing sound, often followed by coughing or crying. In rare cases impaction of the epiglottis or permanent cessation of breathing may cause death during the paroxysm.

The attack may be frequently repeated during the day or night, and the affection may continue for months.

The diagnosis presents no difficulty. It depends upon the absence of inflammatory symptoms in the larynx, the presence of a neurotic state, association with rickets or tetany, and the cessation of the spasm with the prolonged high-pitched sound upon inspiration.

The treatment of the paroxysm requires promptness of action. The child must at once be raised to the sitting posture, cold water be dashed into the face, and face and chest lightly slapped with a wet towel. Ammonia may be held under the nose, and a sponge dipped in hot water be applied to the throat. Cold sponging is very efficient. The hot bath, however, constitutes the most satisfactory treatment, and should be given as soon as it can be prepared. Care must be exercised not to scald the child; cold water must be poured on the head and chest while the body is submerged. The introduction of the finger deep into the throat is advisable in prolonged attacks. Whiffs of chloroform serve well in exceptionally severe cases, and should be restricted to them. If all means fail, and death seems imminent, electricity (Faradism) may be applied, the positive pole to the spine, with the negative pole placed at the hypogastrium. Intubation and even tracheotomy may have to be performed. Death apparently having taken place, artificial respiration must be perseveringly performed to bring about resuscitation.

The cure of the case depends upon the establishment of good health and the removal of exciting causes (undigested food, intestinal worms, etc.). Attention must be paid to irritation arising from dentition. Circumcision may be indicated. The necessity of an appropriate, nourishing diet and careful attention to all the details of the daily life of the infant need only be suggested.

Therapeutics.—The internal administration of a remedy during the paroxysm itself is practically out of question, but a recurrence may be avoided, or the number and severity of recurrences favorably affected, by the exhibition of the indicated

remedy. The following are of especial service: MOSCHUS (1x) has in my hands been the remedy *par excellence*. It is highly recommended by Kunze and other German clinicians. There is fine, wheezing inspiration, loss of breath, cyanosis, tetany. The attacks are brought on by laughing, crying or any nervous excitement, and are associated with spasmodic constriction of the larynx and chest and sense of impending suffocation. Threatening paralysis of the lungs.—GELSEMIUM is highly praised by J. S. Mitchell, who rarely finds any other remedy necessary. "Long inspiration, with short, sudden, violent expiration."—SAMBUCUS. "Starts up in great suffocation, cannot exhale the breath, face grows purple." Between midnight and morning. Alternating spells of sweating and dry heat.—CHLORINE (dilute solution of chlorine gas) has made a good clinical record. Expiration is much more embarrassed than inspiration; it is attended with a slightly crowing sound. Cyanosis and partial unconsciousness.

Consult also ARSENICUM, LACHESIS, VERATRUM ALBUM, CUPRUM, IPECACUANHA, HYOSCYAMUS, BELLADONNA, IGNATIA. In cases of rickets CALCAREA CARBONICA, CALCAREA IODATA, IODUM, PHOSPHORUS, SILICA and SULPHUR should be carefully studied.

PSEUDO-MEMBRANOUS LARYNGITIS.

Pseudo-membranous laryngitis, membranous croup, or true croup, is so closely related to diphtheritic laryngitis that by many authorities it is simply treated as diphtheria involving the larynx. The arguments in favor of this position, from a clinical as well as from a bacteriological standpoint, are very strong, but not conclusive. The fact, however, that of thirty-six cases of croup, reported to the New York State Board of Health (1893) the Klebs-Löffler bacillus was present in thirty, and that bacteriological examinations have established the presence of the specific micro-organism of diphtheria in about eighty-four per cent. of reported cases of pseudo-membranous laryngitis, shows that many special precautions heretofore limited to diphtheria must, as a matter of safety, be practiced in presumed cases of membranous croup.

The essential feature, pathologically, is the formation on the inflamed laryngeal mucosa of a fibrinous exudation holding in its network necrotic epithelium and leucocytes. The exudate varies in color from a grayish- or yellowish-white to a dark, dirty brown when there is considerable extravasation of blood; in thickness it may be a mere friable film resting upon the inflamed mucous membrane or the exudate may be thick, firm, tenacious, leathery. Owing to the fact that the laryngeal mucous membrane is covered with columnar ciliated epithelium, the membrane is much less deeply attached than is the case when the same exudate invades the pharynx; hence it is detached with comparative ease and without leaving behind an extensively necrotic surface. The vocal cords and the inner surfaces of the epiglottis are favorite seats of the exudation, which, though it may extend both upward and downward, in the majority of cases does the latter; hence the frequent intense dyspnoea in cases showing comparative freedom of the subglottic space from exudation. A tendency on part of the membrane to reform a second or third time constitutes one of the dangers of this disease.

Ætiology.—True croup is a disease of childhood, seen with greatest frequency in the second and third year, rarely during the first and after the tenth year, and more often in boys than in girls. It usually occurs in winter and early spring, and in Eastern states is frequently brought on by exposure to a north or northeast wind. Cold and dampness are common exciting causes. Hereditary predisposition and low powers of resistance are factors of importance. One attack affords immunity.

Symptomatology.—The premonitory symptoms are indisposition, with chilliness, slight fever, some hoarseness of voice, redness of pharynx, occasionally enlargement of the tonsils, and some cough. Often these symptoms appear at night, the child feeling somewhat better during the following day, but in the main slowly growing worse, with exacerbation of all the symptoms, especially the hoarseness and cough, during the night.

Usually a few hours before midnight of the second or third day the disease fully declares itself by the appearance of a paroxysm of intense dyspnoea, accompanied with symptoms of

threatening suffocation. Owing to the narrowness of the glottis, the amount of air which is allowed to pass is wholly insufficient, and the patient, in an extremity of distress, calls to his aid every muscle which may be utilized in breathing. The inspiratory sound consists of a hard, prolonged, metallic, high-pitched, whistling, wheezing, stridulous sound, which is never forgotten; the expiratory sound is low-pitched and snoring, accompanied with copious rattling of mucus. While thus suffering, the child frantically clutches at the throat as though relief might be had by tearing it to pieces. The eyes are wild and staring; the face expressive of mortal fright and despair, at first flushed, then cyanotic. Occasionally there is harsh, barking cough, sometimes in paroxysms of considerable severity; after a time, hardly a sound is emitted with the cough. If the filaments of the bronchioles are involved, the dyspnoea becomes excessive. The respiratory efforts grow frantic; the head is thrown far back, and the *alæ nasi* expand and contract violently. The inspiratory recession of the thorax indicates the muscular efforts put forth; it is most pronounced in the supra-sternal and supra-clavicular regions and in the lower thorax, and may even lead to recession of the sternum. The duration of these attacks varies from a few minutes to a half-hour, or more, leaving the patient utterly exhausted. They recur at irregular intervals during which the child may have seizures of threatening suffocation, with no cough and slight, if any, spasmodic action, but otherwise equally distressing and exhausting. Should there be expulsion of membrane, great relief is at once experienced. Breathing becomes easy, the pulse steady, the cough almost ceases, the voice sounds natural, and the child eats and sleeps well. The improvement may continue to recovery. There is, however, danger that the deposit may reform, in which case the issue is doubtful. In the main, a distinct remission and the ejection of pseudo-membrane is a favorable symptom.

If there is no improvement, carbonic acid poisoning takes place, marking the beginning of the third stage, that of asphyxia. The child becomes restless, indifferent, stupid; breathing is superficial and rapid, but comparatively quiet; the face becomes dusky, the lips livid, the hands mottled, the extremities cold, and the body is bathed in cold, clammy per-

spiration. The pulse is rapid, feeble and intermitting; the sensibility of the skin is lost, stupor sets in, developing into coma, and death closes the scene.

Of the *complications* which may arise, bronchial catarrh, bronchitis, pneumonia, pulmonary apoplexy and atelectasis are the more common.

The duration of the disease is from four to six days, but cases often terminate fatally in from twenty-four to forty-eight hours. If there is reforming of the pseudo-membrane, the case may drag along for several weeks.

The prognosis is bad, the fatality of the disease being variously placed at from thirty to ninety per cent. of all cases.

Diagnosis.—In the early stage the differentiation from spasmodic or false croup is impossible; later the following points establish the diagnosis. False croup has more sudden invasion; slight fever, hoarseness, cough and stridulous breathing disappear with the paroxysm; the paroxysm almost always comes on at night, with a condition of comfort during the day; recovery almost always after the third night. In pseudo-membranous croup the invasion is less sudden; the cessation of the paroxysm does not give the same positive relief from cough, hoarseness, etc.; there is no distinct cessation of croup during the day, but a continuous growing worse day and night until recovery or death; the disease runs a longer course; there is expectoration of false membrane.

Acute laryngitis attacks adults rather than children, and has painful deglutition. *Œdema glottidis* is a disease of adult life; it lacks the metallic, harsh cough of croup; expiration is comparatively natural; there is no pseudo-membranous exudation; it presents positive characteristic physical signs upon examination of the parts. *Retro-pharyngeal abscess* has great difficulty of swallowing; tumefaction and stiffness of the neck; the physical signs of a tumor; dyspnœa is aggravated by attempts to swallow, by pressure on the larynx, and by lying down; there is *indistinctness* of voice; in croup, speech, though feeble, is distinct; relief is sought by bending the head backward, and swallowing is not so painful. The difficulty of differentiation from *diphtheria* has been pointed out; the absence of the Klebs-Lœffler bacillus, and the fact that the larynx is first attacked, are points in favor of a diagnosis of croup; it must further be

remembered that true croup is a disease of children, while diphtheria occurs in adults as well.

Treatment.—It is a matter of good judgment to isolate the patient and to practice local and personal disinfection as in diphtheria. The sick-room must be kept at a temperature of from 70° to 80° F., saturated with moisture. Solis Cohen keeps the patient in a closed room, at a temperature of 80° continuously maintained, with towels and cloths wet with hot water hanging all about the room. Water is constantly kept on the stove and grate. Or blankets may be arranged over the bed in the form of a tent or canopy, with an opening near the end for the purpose of ventilation, while through another opening near the middle of the "tent" a steady inflow of steam is kept up from a kettle by means of a tin pipe adjusted to the spout. A few drops of the oil of eucalyptus may be added to the water every few hours. The essential point is to secure a hot, moist atmosphere, and to maintain it until recovery is assured. The excellency of the plan is generally admitted. Direct applications to the larynx are out of question since the child is too uneasy to submit to any manipulation without serious risk of injuring the structures and thus inviting extension of the exudate. Inhalations of slaked lime or of bromine (one drachm of potassium bromide, one grain of bromine, one ounce of water) has proved of service in relieving the dyspnoea. It is also an excellent plan to spray the throat with a solution of bichloride of mercury (1 to 5000) or hydrogen peroxide (equal parts of ten-volume solution and of water). External applications to the throat, as of cloths wrung out of hot water, are of slight value, since any benefit likely to be derived from them is more than offset by their pressure and the resulting additional discomfort in breathing. The diet must consist of hot milk, with the addition of meat extracts, peptonoids, etc. Water may be drunk *ad libitum*. Alcoholic stimulants may be used throughout, if indicated by the general condition of the case. Intubation and tracheotomy become a probable last resort in cases where the larynx is practically blocked by pseudo-membranous deposit. The uselessness of an operation after the exudate has invaded the bronchi is apparent.

Therapeutics.—The exhibition of the proper remedy is of chief importance. In the early stage ACONITE, BELLADONNA

or FERRUM PHOSPHORICUM are usually indicated by the symptoms. In the second stage the choice of remedies will probably lie between SANGUINARIA, IODINE and KALI BICHROMICUM.—SANGUINARIA, so far as its provings show, has a very decided action upon the respiratory organs, including the larynx, but not sufficiently profound to indicate its really great value in the treatment of this dangerous affection. There is much dryness of the throat, which feels swollen and constricted; harsh, hoarse cough, sometimes almost continuous, again occurring in paroxysms, often metallic and whistling; difficulty of breathing is great, labored “sawing,” rasping; the voice is hoarse, sometimes lost, and there is occasional expectoration of tough, glairy mucus. The presence of fibrinous exudation in the pharynx and of symptoms which suggest the “diphtheritic” type of laryngitis are important indications for its use. I have had the best results from the NITRATE OF SANGUINARIA in the low triturations, combined with inhalations of watery solution of the same. Nichols highly recommends a syrup made by adding twenty grains of Sanguinaria to four ounces of vinegar, which is steeped, and then has added an ounce of sugar to form a syrup.—IODINE (given internally in one-drop doses of the strong solution every two hours and by inhalation in equally small doses) has made an excellent record in the hands of many of our best clinicians. T. F. Allen states “our experience is that it is indicated in cases in the early stage, with more or less fever, with dry skin and a very dry cough, great difficulty in respiration; it follows closely after ACONITE; if ACONITE has been given and the patient is not improving, or if ACONITE has only relieved his restlessness and extreme anxiety, but not the cough, the patient is still dry and hot, and the cough still croupy, then give IODINE; it is, however, rarely useful after febrile excitement has disappeared or if the patient perspires freely.” “(1) My own experience is fully in accord with that of Elb who recommends it in cases with violent fits of coughing, threatening suffocation, with whistling tone, and great anxiety; hissing, sawing, respiratory sound, painfulness of the larynx; hoarseness and red face, synochal fever; consequently at the first appearance of the disease. (2) When there are long-continued fits of loose-sounding coughing, without great danger of suffocation, which affords no relief; slight painful-

ness of the larynx; strong sawing and hissing, but not whistling, respiratory sound; temperature of the skin not elevated; frequent, hard, but not full pulse. (3) Absence of cough or occasional short, loose-sounding, croupy cough; constant but moderate oppression on the chest; rough, sawing, not whistling, respiratory sound; cold, moist skin, small, hard, quick pulse. (4) Involvement of the bronchial ramifications, with absence of cough; inaudible vesicular inspiration; short, quickened respiration; loss of voice, with weak, sawing, rather rattling respiratory sound; pale, haggard countenance, cold, clammy sweat; small, rapid thready pulse."—Inhalation of iodine may be practiced by pouring a few drops of a fresh solution of iodine into a shallow vessel containing hot water, directing the patient to bend the head over the vessel, thus inhaling the vapor. Old solutions of iodine are almost useless.—KALIBICHROMICUM is especially indicated by the thickness and tenacity of the membrane and the ropy, tenacious character of the expectoration. There is a tendency to fibrinous deposits on the pharynx. Hoarse, barking cough, sawing respiration; harsh, rough voice; cool skin.—Less prominent, yet very useful, are: ARSENICUM, with characteristic restlessness, fever, prostration, dyspnoea from œdema of the glottis.—HEPAR SULPH. Hoarse, rattling, croupy cough without expectoration; difficult inspiration, easy expiration; only moderate embarrassment of breathing; stitching pains from ear to ear.—TARTAR EMETIC. In the late stage, with rattling of mucus in the throat and chest, but without expectoration; great exhaustion, pallor, coldness of the surface, cold, clammy sweat and great difficulty of breathing.

Consult IPECACUANHA, BROMINE, KALI MURIATICUM, MERCURIUS CYANATUS, SPONGIA.

SYPHILITIC LARYNGITIS.

Syphilitic inflammation of the larynx is either inherited or acquired.

The *hereditary* disease nearly always shows itself during the first six months of life; occasionally it appears after puberty. The gummatous infiltrations tend to deep and extensive ulceration, with probable deformity or stenosis of the larynx from cicatricial formations.

The laryngeal manifestation of *secondary* syphilis consists of a catarrh which presents no characteristic features, with superficial and symmetrical ulcerations on the cords or ventricular bands. Mucous patches and condylomata are seen rarely. The symptoms consist of hoarseness and laryngeal irritation.

Tertiary syphilis affects the larynx more frequently and more profoundly. True gummata, multiple or single, and varying in size from a pin's head to a hazel nut, appear in the submucous tissues, oftener at the base of the epiglottis. They may undergo resolution or break down; if the latter, the ulceration is deep and extensive, often involving the cartilages, with danger of serious hæmorrhage from the erosion of the walls of blood-vessels or of sudden death from acute œdema. The presence of gummata is in itself capable of producing dangerous narrowing of the larynx. The cicatricial formations which result from healing of the syphilitic ulceration may give rise to deformities of the larynx and stenosis, requiring for their radical cure operative treatment, including tracheotomy. The symptoms of this form are varied and intense, including loss of voice, hard cough, great pain, dysphagia and, later, respiratory embarrassment from mechanical obstruction.

The diagnosis is rarely difficult in the presence of other symptoms betraying the syphilitic origin of the affection. The character of the ulceration and the offensiveness of the discharge are important helps.

Treatment consists of keeping the parts clean and of the use of such local measures as will maintain a check upon the spread of the ulcers. (Cleanse the ulcer, then treat with cocaine, dry the parts, and cautiously apply a strong solution of silver nitrate).

Constitutional treatment is important, and consists of the exhibition of Potassium iodide or Mercury. J. S. Mitchell recommends MERCURIUS CORROSIVUS (6x trit.) as capable of promptly healing secondary ulcers with considerable secretion and inflammatory areola about the ulcer and expectoration of offensive sputa.—KALI IODATUM in the tertiary form with rapid destruction of tissue, dry cough, burning sensation in the larynx.—NITRIC ACID: great soreness, bleeding, marked irritability.

Consult also the remedies given under syphilis and tubercular laryngitis.

Cicatricial stenosis requires dilatation (Schroetter) or tracheotomy.

DISEASES OF THE BRONCHI.

ACUTE BRONCHITIS.

The term "acute bronchitis," as here used, means an acute catarrhal inflammation of the mucous membrane of all the bronchial tubes save the bronchioles; inflammation of the latter always involves the vesicular structures and constitutes a pathological entity described as "broncho-pneumonia." The use of the term "capillary" bronchitis is no longer allowable. The condition formerly described under this heading is either a true broncho-pneumonia or a catarrhal inflammation of the bronchial mucous membrane just stopping short of involvement of the bronchioles and vesicular structures, a condition which causes no characteristic clinical symptoms, no unmistakable physical signs, and no constant *post mortem* appearances.

Ætiology.—Primary bronchitis is usually the result of taking cold, more frequently from exposure of some part of the surface of the body—as getting the feet wet, exposure to cold draught on the back, or sitting on the damp ground—than of the whole body. It occurs frequently in changeable, moist climates, during the inclement seasons of fall and spring. It preferably attacks children and persons enfeebled by age, ill health, physical exhaustion, close confinement, living amid unhealthful surroundings, or those of indolent and luxurious habits, or persons who are very susceptible to "colds," especially those who have suffered from previous attacks of bronchitis. It is often secondary to measles, influenza, whooping-cough, variola, and typhoid fever. Again, it may complicate certain affections of the pharynx (diphtheria), tuberculous or syphilitic laryngitis, or grave infectious diseases, such as typhus or typhoid fever, and certain diseases of the nervous system (locomotor ataxia, bulbar paralysis, etc.).

Morbid Anatomy.—There is redness and hyperæmia of the tracheal and bronchial mucous membrane, which is covered with mucus and muco-purulent matter; desquamation of the

ciliated epithelium; swelling of the submucous structures; infiltration of tissue with leucocytes and distension of the smaller bronchi with mucus and muco-pus. The affection is bilateral.

Symptomatology.—Bronchitis usually begins as a common cold, with some shivering, cold hands and feet, aching in the back and bones, sense of coldness “within” from the slightest draught and without any cause, some headache, a slight feverish condition, and scanty, watery coryza. The cold “works downward,” getting into the larynx, trachea, then into the “chest,” with symptoms characteristic of catarrh of the parts successively invaded. In severe cases there may be a slight fever, with a temperature of 101° to 103° F. Involvement of the bronchi is announced by a sensation of tightness and oppression in the chest, with more or less rawness under the sternum. The cough, at first laryngeal, becomes hard, ringing, almost concussive, occurring in paroxysms which fairly tear the chest to pieces and greatly aggravate the soreness, especially beneath the sternum, in the intercostal spaces, and along the attachments of the diaphragm. The cough at first is dry; in a day or two it is followed by slight expectoration of mucus, which becomes more copious and muco-purulent, terminating in a free expectoration of purulent matter, with great relief of pain and soreness. Exceptionally, when the cough is unusually violent, the expectoration may be blood-streaked; in the case of infants it is swallowed, and there may be gagging and vomiting. The oppression and shortness of breathing are moderate, except when the finer tubes are involved or when there is excessive secretion of mucus. With the appearance of free expectoration the general condition of the patient improves; fever subsides and, in healthy adults, recovery usually follows in another week or ten days.

In young children and aged people bronchitis is much more serious. In both, extension of the affection into the fine bronchi and even bronchioles is common, in children particularly when it is associated with measles, influenza or whooping-cough. The fine tubes are filled with muco-purulent matter, and dilatation takes place, inducing areas of collapse and broncho-pneumonia. In old and feeble persons, inability to expel the accumulation, especially when the bases are extensively involved, leads to the same result.

Physical Signs.—There is, in mild cases, slight increase of respiratory movements, greatly exaggerated when the fever is high or the finer tubes are involved. Palpation reveals bronchial fremitus. Upon auscultation sibilant râles are heard in the early stage, which disappear with coughing. If the case is mild and only affects the large tubes, these may be indistinct. Later, with increasing freedom of secretion and relaxation of the mucous membrane, the râles become coarse and bubbling. Extension into the fine tubes, in children, is accompanied with subcrepitant râles, areas of defective resonance, and feeble or distinct tubular breathing.

The prognosis in healthy adults is good, convalescence taking place in a week or ten days after the appearance of free expectoration; if neglected, or after repeated attacks, the disease may assume the chronic form. In infants and very feeble adults, and in the aged, bronchitis is always serious.

The diagnosis is easy, and there is rarely difficulty in differentiating bronchitis from fibrous pneumonia or whooping-cough. Localized bronchial catarrh, unilateral, is well calculated to arouse suspicion, especially when occurring at the apex or apices of the lungs, since it often is the first objective sign of pulmonary consumption.

Treatment.—A mild case requires little attention beyond such common-sense measures as are familiar to all. A copious sweating is always advisable, provided caution is taken to prevent catching additional cold. A hot foot bath at night, with a hot lemonade taken just before going to bed, accomplishes this purpose. A Turkish bath is objectionable and dangerous because of exposure in returning home from the bath. Even in light cases the patient should remain indoors until the attack has passed away. If there is fever, it becomes necessary to keep the bed and to maintain in the room an even temperature which, during the stage of dry cough and rawness in the chest, should be thoroughly saturated with moisture. A wet compress or a mustard draft on the chest is unobjectionable, and usually relieves pain. Young children and old people should receive careful attention from the first. The former, if there is any fever, should be put into a hot bath, two or three times during the day, cold water being applied, while in the bath, to the head and chest. Or the wet pack may be used, wrapping the

child in a sheet wrung out of water at a temperature of 68° to 75°, with a flannel blanket outside, the pack to be renewed two or three times during the day. The bath and wet pack favor free expectoration and exert a favorable influence on the course of the disease, materially lessening the danger of invasion of the fine tubes. Proper precautions against taking cold must, of course, be observed. If, in the case of young children, expectoration ceases, there is great difficulty of breathing and the skin and nails become blue, it is then safe and advisable to give an emetic, preferably a tablespoonful of the wine of ipecacuanha; this may be repeated, if necessary.

The universal use of opium for the relief of the cough is unnecessary, save in very exceptional cases, and then minute doses of $\frac{1}{32}$ of a grain, repeated a few times, usually answers the purpose. In children and in old and feeble people morphine is exceedingly dangerous.

The *diet* should be nourishing, but light. Hot drinks may be given freely. In the case of children and the aged feeding is important, for their strength must be sustained to the fullest extent possible. Alcoholic stimulants, especially in old people, are indicated.

Whatever increases the tone of the system and its powers of resistance, and strengthens the respiratory apparatus in persons predisposed to bronchial and pulmonary disease, comes under the head of prophylaxis. Here belongs attention to proper clothing, care in avoiding exposure to drafts or inclement weather, systematic bathing and sponging of throat and chest in tepid or cold water, and such breathing-exercises as aid in the development of a weak chest.

Therapeutics.—At the beginning ACONITE is usually indicated by its characteristic restlessness, pulse, fever, cough, thirst, etc. The cough is dry, hard, ringing, worse after drinking cold water and from lying on either side; better from lying on the back. The breath is hot. Urine diminished, hot, dark, red-brown, turbid; the restlessness is increased before urinating, and the act itself is sometimes painful.—VERATRUM VIRIDE is called for in cases of exceptional violence from the first, with great dryness and heat of the body, high temperature, full, hard, rapid, bounding pulse; tendency to stupor, and bloody or blood-streaked expectoration.

Later the choice usually lies between: **BELLADONNA**. Congestive type; great heat; dry, spasmodic cough, especially at night; expectoration of bloody mucus.—**BRYONIA**. Dry, tearing cough, especially at night, with substernal irritation, often terminating in a fit of vomiting; sharp pleuritic pains, worse at night and from motion.—**CALCAREA CARBONICA**. Tickling in the throat as from a feather, from talking; yellow, thick, fetid expectoration; children of characteristic temperament, with enlarged cervical glands.—**DROSERA**. Convulsive, spasmodic cough, something like whooping-cough, from tickling in the throat; coughing and vomiting; expectoration of gray, yellow, greenish color.—**FERRUM PHOSPHORICUM**. Sharp, short, spasmodic cough; moderate fever and restlessness; painful cough, oppression and dyspnoea; expectoration clear or blood-streaked.—**HEPAR SULPH**. Deep, dry, harsh cough; cough loose and rattling, worse from inhaling cold air and toward morning. Soreness in the chest; substernal stitches; wheezing inspiration.—**KALI BICHROMICUM**. Hoarse, whistling cough, excited by tickling in the throat, with tenacious, stringy expectoration. It comes from low down in the chest and is worse from eating and in the morning.—**PULSATILLA**. Rather mild cases. Dry cough or an easy cough with free expectoration of thick, yellow mucus. Cough becomes dry and spasmodic at night, and continues so during the night. Worse in a warm room.—**SANGUINARIA**. Soreness, burning and stitching pain in the chest. Dry cough, with dryness and sense of constriction in the larynx and chest. Tickling and crawling sensation under the sternum. Scanty, glairy expectoration.—**RUMEX**. Cough dry, incessant, with tickling in the larynx and trachea; great sensitiveness to cool or cold air, which at once aggravates the cough; he even covers up his head to avoid inhaling cold air. Cough worse in the morning and at night; it seems to come from behind the sternum.—**SPONGIA**. Wheezing, asthmatic cough, sometimes with profuse expectoration and suffocative attacks; cough better from eating, worse in a hot room and from lying with the head low. Hoarseness.—**SQUILLA**. Violent rattling of mucus in the chest, which is raised after much effort and in small amounts, followed by relief. Cough brought on by drinking; spasmodic; with involuntary micturition.—**STANNUM**. Cough dry in the early part of the night; during the day

expectoration of solid lumps of mucus of sweetish taste; salty expectoration; cough worse from talking, laughing, lying on the right side, taking warm drinks; great weakness in the chest and weak voice.

In cases of involvement of the fine bronchi or threatening broncho-pneumonia the following are important: PHOSPHORUS. Full hard pulse and high temperature. Later, great weakness; feeble and rapid pulse; frothy expectoration; dry, short cough, caused by excitement of any kind and seemingly proceeding from the pit of the stomach; night cough; great oppression of breathing.—IPECACUANHA. Exceedingly valuable in children when there seems to be a complete filling up with mucus, with spasmodic cough, retching and vomiting of large quantities of phlegm. Cough with threatening suffocation.—TARTAR EMETIC. Filling up of the air passages with mucus, causing great dyspnoea, even to threatening suffocation; constant wheezing and rattling of the chest, cold clammy sweat, utter prostration. Threatening paralysis of the lungs in children and old people. (The low triturations should be used here.)—ARSENICUM has proved helpful in severe cases, with extreme dyspnoea, great exhaustion of the nervous system, characteristic excessive restlessness, even to anguish, cold sweating, etc. The cough is worse after midnight and from lying on the back. Expectoration is scanty.

In mild cases of bronchitis, with an asthmatic tendency, loud râles and weak action of the heart, GRINDELIA ROBUSTA, in drop-doses of the mother tincture, often proves helpful.

CHRONIC BRONCHITIS.

Ætiology.—Chronic bronchitis is a disease of advanced years, rarely occurring in the young. It frequently follows repeated attacks of acute bronchitis, but often is seen as a secondary affection to cardiac or renal disease, pulmonary phthisis, rheumatism or gout. Men are its victims oftener than women.

Pathological Anatomy.—Chronic hyperæmia, with thickening and swelling of the mucous membrane, is common; atrophy of all the layers is, however, frequently seen in old cases. Bronchiectasis and emphysema in varying degree are always present.

Symptoms.—Distinct varieties are recognized, each presenting a distinct clinical history. Of these, the so-called *Winter cough* or *bronchitis of old men* is the most common. It is peculiar to old people, and is troublesome chiefly during the cold, damp and changeable months of the year, frequently disappearing regularly during the dry, warm months of summer. The cough itself varies. In some cases it is almost constant; in others, a paroxysm in the morning, of varying duration and intensity, affords relief for the succeeding twenty-four hours; again, the patient may cough little during the day, but is kept awake all night, in aggravated cases coughing almost incessantly. Expectoration is usually abundant and of a mucopurulent character; rarely there is no expectoration. There is almost always considerable shortness of breath, a good deal of wheezing and puffing, and in some cases considerable difficulty in ascending stairs or an elevation, owing to existing emphysema and cardiac weakness.

General health is not especially affected; there is rarely fever, save with an intercurring acute paroxysm; but the duration of the affection is indefinite, and a cure often impossible. The physical signs are hyper-resonance upon percussion; prolonged expiration, with wheezy rhonchi of greatly varying pitch and quality upon auscultation, and usually considerable crepitation at the bases.

Dry catarrh (*catarrhe sec* of Lænnec) has very scanty secretion. Cough occurs in violent and distressing paroxysms, often of long duration, with redness of the face, swelling of the veins, and great muscular effort, followed by scanty expectoration of tough, stringy, semi-transparent mucus. Patients of this class often suffer from emphysema and severe attacks of asthma. Auscultation yields sibilant rhonchi, but no râles. General health is good. The affection is intensely chronic.

Bronchorrhœa (bronchial blennorrhœa) consists of violent paroxysms of coughing with expectoration of serous, seromucous, or mucopurulent matter, which may be blood-stained if the paroxysm of coughing has been unusually severe. In some cases the amount raised is scanty, but usually it is very large, frequently exceeding a pint in the twenty-four hours. If allowed to stand in the sputa-cup, the purulent part of the expectoration sinks to the bottom, the frothy sero-mucus re-

maining on top. It is seen chiefly in connection with cardiac affections. General health suffers comparatively little, save as considerable emaciation may occur in cases of more than common severity. The duration is indefinite, often many years, unless death occurs from disease of the heart. Abundant moist râles are heard in the lower lung; these are much diminished after copious expectoration. Bronchiectasis is pronounced. A somewhat rare form was described by Lænnec (catarrhe pituiteux, true bronchorrhœa, humid asthma), in which intensely severe paroxysms of coughing, usually at night and lasting from half-an-hour to an hour, or more, accompanied with severe respiratory symptoms, are followed by the expectoration of enormous amounts—even one to two quarts in twenty-four hours—of thin, frothy, purely serous sputum. In these cases abundant and extensive moist râles are heard, with slightly lessened or normal resonance on percussion.

Putrid or fetid bronchitis occurs in connection with bronchiectasis, gangrene or abscess of the lungs, or from the entrance of bacteria of putrefaction into the contents of a tuberculous cavity, or in empyema. It is rarely primary. Its appearance in a case is rather sudden, and is preceded by a chill and elevation of temperature. Its most characteristic feature is the horribly offensive character of the secretion. The expectoration, upon standing, separates into three layers: an upper layer, frothy and muco-purulent; a middle layer of scanty, greenish sero-albuminous fluid; and a lower, yellowish-green, purulent sediment, containing small, rather more solid, cheesy masses, casts of the finer bronchi, which crumble under pressure and emit the fetor. ("Dittrich's plugs.") The affection is rare and very obstinate. It continues for years, sometimes for life, with exacerbations and remissions of varying duration. It may lead to pneumonia, pulmonary abscess or gangrene; abscess of the brain has occurred from metastasis.

Treatment.—When within the reach of the patient, a summer residence away from the dust and dirt of the city, preferably near the sea, should be insisted upon, with a winter home in some Southern state, as Florida; still better is a permanent residence in Southern California. Such a change of climate does not lessen the necessity of attempting to remove the primary cause of the chronic bronchitis and of medical treat-

ment, but it affords chances of recovery under treatment which cannot be had otherwise. Persons who are not able to afford a change of climate must exercise the utmost care to fortify themselves against changes of weather and to reduce to a minimum all chances of avoidable exposure. If their occupation is unwholesome, it must be changed. The house must be kept well ventilated and at an even temperature (from 68° to 70°). Underwear and upper garments must be adapted to the seasons of the year; particular pains are to be taken at the approach of warm weather not to discard prematurely the heavy winter-underwear. The feet must be kept warm and dry. Bathing the chest and throat in cold water, followed by brisk rubbing, is highly important. Chest protectors are forbidden. Drafts and badly ventilated or badly heated rooms, as theatres and other public places, cannot be visited with safety during the greater part of the year. In damp, cold days the patient must remain in the house; otherwise he is to live in the open air as much as possible, even though it may be cold. Stimulants may be used in moderation.

Inhalations are of much benefit, if properly used. In dry catarrh, a ten-per cent. solution of sodium chloride or of bicarbonate of soda, used by steam atomizer, affords much relief. If the secretion is abundant, inhalations of turpentine, persistently followed, are excellent. A teaspoonful of turpentine may be added to a small vessel of boiling water and the steam inhaled as it arises, or the so-called turpentine-pipe may be used. The latter consist of a flask partly filled with water, on the top of which rests a thin layer of oil of turpentine (or of oleum pinus pumilionis). Two glass tubes, open at both ends, are passed through the cork. One of these extends into the layer of water; the lower end of the other is left free in the upper part of the flask, the upper end, bent at a proper angle, forming the mouth piece of the "pipe." The latter the patient sucks, and may thus for an indefinite length of time inhale the turpentine-laden air. Inhalations of eucalyptus are also useful. Turpentine may also be administered internally, from five to ten drops in a capsule. Terpin hydrate, from four to six grains, taken three or four times a day before eating, checks the expectoration, and must therefore be used with some care.

Fetid bronchitis requires the use, by steam atomizer, of a

two- or five-per cent. solution of carbolic acid, or of thymol (1 to 1000) or of ten drops of a solution containing equal parts of terebene, carbolic acid, and spirit of chloroform. These should be used from three to five minutes at a time, three or four times daily. It is also necessary to keep a strong disinfectant, as carbolic acid, in the sputa-cup, and to frequently spray with a ten-per cent. solution of carbolic acid the room which the patient occupies. Myrtol, in five-grain doses internally and as an inhalation, lessens the expectoration and the fetor.

The primary affection must not be neglected, and complications are to be met as they arise.

Therapeutics.—The remedies to be exhibited are largely those discussed under “Acute Bronchitis.” Dr. Hale (Practice of Medicine) furnishes an excellent chapter on “cough remedies” which deserves careful study.—**AMMONIUM CARBONICUM** is a valuable remedy in the chronic bronchitis of old people (with emphysema), with constant tickling in the larynx and under the sternum, loose and rattling cough, with scanty, sometimes blood-streaked, expectoration, accompanied with much debility and shortness of breath.—**AMMONIUM MURIATICUM** is not so often indicated, but acts well when the cough is violent and dry, but becomes loose in the afternoon, with much rattling of mucus, copious expectoration, and coldness between the shoulder blades.—**ARSENICUM** is highly recommended by J. S. Mitchell in fetid bronchitis. “In all forms of chronic bronchitis of old people it is useful in mitigating the asthmatic symptoms and relieving the irritative symptoms.”—**CAUSTICUM**. Exceptionally, with characteristic laryngeal complications, loss of voice, etc.—**COPAIVA**. Profuse, easy, purulent expectoration. (Hale gives two minims on sugar disks.)—**CUBEBA**. Tearing cough, with difficult expectoration of stringy, white or gray mucus.—**DROSERA**. Severe paroxysms of hoarse, harsh cough, ending in vomiting, especially at night, immediately after lying down.—**EUCALYPTUS**. Bronchitis with profuse expectoration.—**KALI CARBONICUM**. Dry, paroxysmal, suffocative cough, with sharp, cutting pain in the sides of the chest and hypochondria. Attack of asthma three to four A. M. Patient weak, short-breathed. Scanty, difficult expectoration of sticky, grayish mucus.—**RUMEX CRISPUS**. Sensitiveness to cold

air; incessant dry cough. Asthma and sense of suffocation, worse at two A. M.—SENEGA. Difficult raising of tough, profuse mucus, with hard, loud breathing, anxiety, sensation of weight in the chest, and soreness of the chest walls. Cough worse in the evening, at night, lying on the right side.—SILICA. Expectoration transparent or opaque, tough and tenacious. Meyhoffer thinks it essential to the cure of the “catarrhe pituiteux” of Laennec.—SULPHUR. Cough attended with heaviness of the head and dim vision. Expectoration of large quantities of tenacious mucus, or scanty, yellowish, white sputa; putrid bronchitis, after the suppression of eruption; gouty and rheumatic diathesis. Sensitiveness of the skin to atmospheric changes.—Hale recommends the iodides as a class; IODIDE OF LITHIA when of gouty origin; IODIDE OF POTASSIUM when humid asthma is present.

FIBRINOUS BRONCHITIS.

Fibrinous, croupous, pseudo-membranous or plastic bronchitis is a rare acute or chronic disease of the bronchial mucous membrane, characterized by the formation of pseudo-membranous casts in the tubes, which are expelled in paroxysms of great dyspnoea and coughing. The term is restricted to that form in which the fibrinous deposit occurs primarily in the bronchi, and is never applied to secondary involvement arising in diphtheria, croupous pneumonia, or other diseases of the lung.

Ætiology.—Very little is known of the causation of this affection. It is very rare, but appears to occur oftener in males during the third and fourth decade of life. It has been known to attack several members of one family and to assume almost endemic features. The greater number of cases were observed in spring. It is frequently associated with pulmonary tuberculosis and appears to have a vague relation to the menstrual period; it has also been seen in the course of acute infectious diseases (typhoid fever) and in connection with pemphigus, herpes, and impetigo.

The **pathology** of the disease is obscure. The most striking and as yet unexplained features are the preference for certain territories in the lung and the recurrence of the fibrinous for-

mation throughout a period of varying length, sometimes at regular stated intervals. The pseudo-membrane itself is distinctly "croupous," but of an unusual degree of density.

Symptomatology.—The *acute* form resembles a severe acute bronchitis, with fever, cough, dyspnœa, sometimes hæmoptysis. The expulsion of the fibrinous coagulum may occur early or after several days, and is always associated with a severe paroxysm of choking and coughing. The attack may last a few days or several weeks. The prognosis is grave, with fatal termination in from 25 to 50 per cent. of all the cases within fourteen days. The *chronic* form is somewhat milder, but presents very much the same picture, with recurring attacks, at greatly varying intervals, for a period which may cover many years. Bronchitis always exists, frequently with very slight, if any, fever. The cough is harassing, frequently in paroxysms; dyspnœa is usually pronounced and often very distressing; the expectoration may be stained or streaked with blood, and moderate hæmoptysis is not unusual. The expulsion of the pseudo-membrane is followed by relief of the urgent symptoms. The prognosis here is much more favorable than in the acute form. The physical signs of bronchitis, theoretically, should be present and well marked; in actual practice they are vague and recognized with considerable difficulty.

The **diagnosis** depends entirely upon the presence of the fibrinous cast. This may be found by thoroughly washing the coagulum in water. It is tough, elastic, yellowish-white, constituting a perfect cast of a bronchus of the second or third order with all its final ramifications, varying in length and thickness, the larger tube usually being hollow and of the size of a small goose-quill, the smaller, solid and threadlike. The membrane shows a definite laminated structure. Hyaline transformation of the fibrin is not unusual. Leucocytes and red blood corpuscles are imbedded in the fibrous network, while alveolar epithelium and carbon particles are frequently seen in the lumen of the smaller twigs. Since the bronchi in the upper lung subdivide more rapidly than those in the lower portion, the appearance and size of the cast serves to locate the seat of the affection.

Treatment.—The treatment is that of bronchitis. Inhalation of ether, atomized lime water and steam aids in the expulsion

of the membrane. An emetic may become necessary for the accomplishment of this purpose. Of internal remedies, PHOSPHORUS deserves especial consideration.

BRONCHIECTASIS.

Bronchiectasis or dilatation of the bronchial tubes occurs in chronic bronchitis and emphysema, broncho-pneumonia of children, from the presence of a foreign body in the air tubes or the compression of a bronchus by an aneurism. In these cases the operative causes are weakening of the walls from atrophy of the tissues which follows inflammation, with resultant inability to withstand the air-pressure during severe paroxysms of coughing and the weight and pressure of accumulated secretions. In other cases this condition is brought on by forces from without, traction upon the walls of the bronchi being made by the contraction of the fibrous framework of the lungs; this condition obtains in chronic pleurisy, cirrhosis of the lung, and chronic pulmonary tuberculosis. Very rarely bronchiectasis is congenital; when congenital, it is always unilateral.

Two forms are distinguished: the cylindrical and the saccular. The former is usually the result of chronic bronchitis, with emphysema, whooping cough, measles, phthisis. It affects the bronchi of the second and third order. It is very difficult of recognition during life. The saccular form consists of oval or spherical dilatations, in size varying from a pea to an orange; these develop gradually and sometimes freely communicate with each other; again they may form a closed cavity. Dense fibrous tissue separates the sacculi. The walls consist of a thin membrane, the original bronchial wall in a state of extreme atrophy; occasionally the structures have undergone hypertrophy, and band-like projections and swellings are noticed. Erosions and ulcerations may take place in the dependent part and extend into the surrounding tissue, constituting a pus cavity. The dilatations are almost always multiple and surrounded by hardened, contracted lung tissue. A single bronchiectasy, surrounded by normal lung tissue, is rare; it may occur in bronchitis and emphysema. The contents of the larger cavities are excessively fetid.

Symptoms.—Characteristic symptoms arise only in connec-

tion with the larger bronchiectases, and then refer to the peculiarities of cough and expectoration. The cough comes on at considerable intervals and is followed by characteristic expectoration. Oftenest coughing occurs in the morning, the secretion having accumulated during the night. Again, a change in position, by causing an outflow of the secretion into the normal tube, may bring on a fit of coughing with copious expectoration. The expectorated substance is fluid, grayish or grayish-brown, of a peculiar sour odor, sometimes horribly fetid. If allowed to stand and settle, it separates into a thick, granular layer below, then a thin serous, slightly mucoid layer, and a brownish froth on top. The sedimental layer consists largely of pus corpuscles and bundles of fatty acid crystals; hæmatoidin crystals and elastic fibres are present when there is ulceration. Nummular expectoration, as pertains to phthisis, is not common. Hæmoptysis is rare.

The diagnosis of a large bronchiectatic cavity lying near the surface of the lung is not difficult; it presents clearly marked cavernous sounds and amphoric signs, with impaired resonance, bronchial respiration, and increased vocal fremitus over the adjacent surface. Such cavities are usually found near the base of the lungs; the sounds necessarily vary as the cavity is full or empty. Moderate and even quite large bronchiectases lying deep within the substance of the lung rarely yield reliable physical signs. Struempell lays down the rule that the more abundant the formation of bronchiectases, the more does the respiration lose its vesicular character and become hard and finally bronchial.

The *course* of the affection depends upon the primary disease of which it usually is a serious complication, not infrequently causing pulmonary gangrene, tuberculosis, or other grave conditions. On the other hand, it may exist for many years in an extensive form and cause only slight disability.

The treatment must be directed to the primary disease. If the expectoration is very offensive, methods advised under "fetid bronchitis" are to be followed here.

BRONCHIAL ASTHMA.

An affection which is characterized by recurring paroxysms of urgent dyspnoea, with cough and expectoration.

Ætiology.—The causation of asthma is still involved in doubt, although the presence of the neurotic element is recognized by all. It is probable that the essential feature is a considerable hyperæmia and swelling (vaso-motor turgescence) of the mucous membrane lining the fine bronchi or the bronchioles, due to direct irritation or irritation brought about by reflex influences. As pointed out by Osler, this hypothesis, more readily than any other, explains the respiratory embarrassment, the quality of the râles, and the presence of viscid, tenacious mucus during the paroxysm. A family tendency to asthma is noticeable, and most pronounced in those of a neurotic temperament; it may be associated with other expressions of neurosis, as neuralgia or epilepsy. Climate is a factor; yet it is closely allied with idiosyncrasy, some persons suffering from asthma only at certain seasons or in certain localities which fail to produce the same results in other victims of the disease. Sometimes breathing the air of some particular room or the odor of some flower, emanations from certain animals, or excitement, as a fit of anger or a fright, will bring on an attack. Bronchitis is closely connected with a large majority of all cases; affections of the nose, especially hypertrophic rhinitis and nasal polypi, rank next; hence the necessity of avoiding "taking cold." Uterine and ovarian disease, gout, indigestion, etc., may by exciting reflex action precipitate an attack of asthma.

Symptoms.—In some cases premonitory symptoms are noted, such as might suggest having taken cold or laboring under unusual mental depression. In the greater number of cases the patient is roused from sleep by difficult and labored breathing, which increases rapidly, culminating in a paroxysm of agonizing dyspnoea. The number of respirations is not greatly, if at all, increased, but the inspiratory effort is intense, calling into requisition the full force of all the accessory muscles, with hardly any success; expiration is prolonged and wheezy. The general appearance of the patient bears witness to the distress experienced; if prolonged, the face is bathed in cold sweat, the pulse becomes fluttering, the extremities cold, and the condition seems one of imminent danger, when the paroxysm yields, breathing becomes easier, and, often after a spell of coughing, the patient finds rest and sleep. These

attacks may last from a few minutes to an hour, or longer, and may recur for days at varying intervals. The physical signs during an attack are: enlargement and fixation of the thorax, involving the diaphragm; short, quick, labored inspiration; prolonged, often wheezing, expiration. Auscultation yields a great variety of râles, sibilant, high-pitched, hoarse and, later, moist.

The sputum consists of small, opaque, round, gelatinous balls or pellets (*perles* of Laennec), held in thin mucus. Unfolded, these represent moulds in mucus of the smaller tubes. Under the microscope they show a curious spiral structure, fully described by Curschmann, presumably the product of an acute bronchiolitis. After the sputum has assumed a mucopurulent character, which it does in two or three days, the spirals disappear. They are thoroughly characteristic of bronchial asthma in the early stage.

Treatment.—The treatment of the paroxysm itself consists of such measures as will relax the spasmodically contracted bronchi. To this end, nitre paper (made by soaking soft paper in a strong solution of potassium nitrate) may be burned in the room; cigarettes containing stramonium, belladonna, lobelia or tobacco often are smoked by the patient and afford relief. If these are not sufficient, a few whiffs of chloroform, or the inhalation of two to four drops of amyl nitrite on a handkerchief, or the hypodermic injection of morphine (alone or with cocaine) may meet the emergency. Inhalations of oxygen or of compressed air in a pneumatic cabinet have each their warm advocates. The radical treatment includes the cure of the bronchitis, rhinitis or other disease which is responsible for the occurrence of asthma. If associated with other manifestations of a neurotic character, these will necessarily determine the course to be followed. In the latter class of cases, as in those associated with bronchitis, the climate plays an important part. Its selection is purely experimental, although in the greater number of cases a moderate elevation and dryness of the atmosphere yield better results than the seashore; but frequent exceptions to this rule exist, as my experience here on the Pacific shore has repeatedly demonstrated. It is safe to assert that Southern California, in some locality, meets the conditions of almost every case of bronchial asthma.

In reference to diet, Osler suggests the wisdom of not eating freely of carbohydrates, of using coffee rather than tea, of taking heavy meals in the early part of the day, and of not retiring to bed before gastric digestion is completed.

Therapeutics.—The most valuable remedies are ARSENICUM, CUPRUM, MOSCHUS, GRINDELIA, IPECACUANHA.—ARSENICUM has a specific action upon the bronchioles, causing a train of symptoms in the provers which strikingly resembles bronchial asthma. Extreme anxiety; short anxious breathing; difficult breathing, with anguish; asthmatic cough; nocturnal aggravations and nightly paroxysms of asthma are parts of its pathogenesis. It is especially useful in dry asthma, and acts well in the aged, feeble and exhausted.—CUPRUM appears to act best when the attacks appear and disappear suddenly, and “when the spasmodic character overshadows all other phenomena.” “Blueness of the face, constriction of the throat, intense dyspnoea, retching and vomiting” (T. F. Allen). Spasms of the hands and feet.—MOSCHUS, given low, is invaluable when the neurotic element predominates. Hysterical symptoms often are present. The chest seems filled with mucus, causing fine sibilant râles throughout. The patient is perfectly wild from fear of impending suffocation. There is sense of intense constriction in the chest, almost cramplike.—GRINDELIA ROBUSTA has done excellent service in attacks depending upon chronic bronchitis, particularly in people of mature and somewhat advanced years who had passed through several attacks of “la grippe” and were left with an “asthmatic tendency.” When in such cases, upon slight exposure, the difficult breathing is gradually increased until it becomes a violent paroxysm of asthma, with large coarse bubbling râles, copious stringy expectoration, with often slight nausea and faintness at the heart, the effects of this remedy are prompt and permanent.—IPECACUANHA, with many practitioners, seems to have lost its old-time reputation in asthma, but I still find it very useful when there is bronchitis with large râles or when the paroxysm of asthma is characterized by much depression and a sense of faintness which appears to overcome the patient. Though evidently suffering intensely, he makes comparatively slight effort to help himself, and appears as though there were not energy enough in him to “resist the current.”

Other remedies to be consulted are: ACONITE. According to Mitchell, in healthy, robust adults, with characteristic restlessness, hard, bounding pulse, etc. Intense violence of the symptoms.—BROMINE. Spasmodic constriction which, it seems, prevents his breathing; better at and near the sea. Asthma of sailors which occurs as soon as they go on shore.—LACHESIS. Asthma of reflex origin. Unwillingness to bear the slightest pressure about the neck or chest. The dyspnœa awakens him.—NUX VOMICA and PULSATILLA, when due to indigestion.—SANGUINARIA when there is a history of hay-fever.—SULPHUR in very tedious cases; suppression of some skin eruption; bronchitis; “fits of suffocation” in the early part of the night, and with burning in the chest. Expectoration of whitish or yellowish mucus. Attacks recurring at regular periods (eight days?) and in the morning.—TARTAR EMETIC, in children and old people; characteristic bubbling râles in the chest, with great dyspnœa, coldness of the extremities, cold sweat, etc.

Clinicians of the dominant school use potassium iodide in chronic asthma, giving it in small, increasing doses. Salter affirms that it cures one case in five of chronic asthma.

DISEASES OF THE PARENCHYMA OF THE LUNGS.

DISTURBANCES OF CIRCULATION IN THE LUNGS.

Pulmonary congestion is active or passive. Active congestion occurs when an unusual amount of blood is forced into the lungs by increased action of the heart (as from violent exercise) and from the inhalation of very hot air or irritating substances; to a more limited extent it is associated with inflammatory action from any cause in the lungs, the interference with the capillary circulation resulting in congestion and distension of the adjacent non-inflamed tissues. The symptoms closely resemble those of an inflammation, with defective resonance, fine râles and impeded, sometimes bronchial, breathing. Death may result, especially from cases due to excessive exertion (as rowing) and exposure to extreme heat.

Passive pulmonary congestion is mechanical or hypostatic.

Mechanical congestion results from inability of the left heart to take its full amount of blood; hence this affection is common in disease of the left heart and in the presence of tumors capable of similarly interfering with the circulation. Upon section the lung tissue is found firm and resistant to the knife and of russet-brown color (brown induration of the lungs), which changes to a vivid red, from oxidation of the hæmoglobin, upon exposure to the air. *Hypostatic* congestion is seen in protracted cases of typhoid fever and in profoundly adynamic states generally. The bases of the lungs are chiefly involved, especially posteriorly. The lung tissue, upon section, is found gorged with blood and serum, and portions of it sink in water (splenization; hypostatic pneumonia). It has also been seen in organic disease of the brain, as cerebral apoplexy.

The treatment is directed to the cause. Free bleeding (from twenty to thirty ounces of blood) from the arm may be necessary when the pulmonary congestion is excessive. The remedies are selected from symptomatic indications.

Œdema results from the transudation of serum from engorged capillaries into the air cells and alveolar walls; hence, it is common in congestion and inflammation of the pulmonary structure. It may be limited to the immediate neighborhood of the portion involved (collateral œdema) or be general. It probably often occurs as a feature of the death-agony. The condition in a greater number of cases depends upon weakness of the left ventricle, resulting in congestion of the pulmonary capillaries, tension and transudation, favored by a dilute, watered state of the blood plasma. *Post mortem*, the involved structure is found heavy, infiltrated, water-laden, with copious escape of clear or bloody serum upon section.

The symptoms are those of increasing cough and dyspnœa. When œdema develops suddenly, it may prove rapidly fatal (as in Bright's disease).

Treatment is symptomatic. APIS, ARSENICUM, and remedies of this class, must be considered. Active catharsis is advised in severe acute cases.

Pulmonary hæmorrhage occurs frequently. The blood is either poured into the bronchial tubes and then expectorated (broncho-pulmonary hæmorrhage, hæmoptysis, bronchorrhagia) or the hæmorrhage takes place into the air cells and

lung tissue (pulmonary apoplexy; pneumonorrhagia; hæmorrhagic infarct).

Hæmoptysis or *blood-spitting* is due to a great variety of causes and is not necessarily an expression of disease. Thus, plethoric persons, especially young men, may bleed quite freely when in the enjoyment of perfect health and without experiencing an untoward symptom. Spitting of blood when ascending a mountain is often the result of increased action of the heart and change in atmospheric pressure. As a symptom of disease it occurs in: Pulmonary tuberculosis, in the early stage or after local lesions have formed. It may be bronchial, or due to erosion of the walls of a blood-vessel or the bursting of an aneurismal dilatation. The early stage of pneumonia, cancer, gangrene, abscess, bronchiectasis. Diseases of the heart, especially of the mitral valve; here it usually is copious and may recur at long intervals. Ulceration of the larynx, trachea, bronchi; usually due to the erosion of walls of vessels (as a branch of the pulmonary artery), hence copious. Aneurism. Among the rarer forms may be mentioned the vicarious hæmoptysis in interrupted menstruation, that of malignant fevers and purpura hæmorrhagica, the pulmonary bleeding of persons of an arthritic history, usually occurring in men over fifty years of age, and the endemic hæmoptysis seen in some portions of China and Japan, which is caused by the presence of an animal parasite, one of the *Distomidæ*, in the bronchi.

Symptoms.—There are no premonitory symptoms. A sense of fulness in the chest, occasionally slight pain, is followed by a warm, sweetish taste in the mouth, slight cough, and the expectoration of blood. The bleeding may be of short duration or continue more or less constantly for days. It is not usually copious enough to excite alarm, unless due to the erosion of a vessel or the rupture of an aneurism, in which case an actual inundation of the lung may take place with, of course, fatal results. A free hæmorrhage may take place into a cavity, and cause death without external signs. In the greater number of cases the bleeding after a time grows less and less, and finally ceases spontaneously, with, for days, slight and decreasing traces of blood in the expectoration. A portion of the blood may be swallowed and vomited up or passed with the stool. The hæmorrhage having ceased, the patient is soon restored to

his usual health, and often appears to feel the better for it. Recurrences may, however, occur at any time.

The blood of hæmoptysis is alkaline in reaction, usually bright, frothy, mixed with mucus and, after coagulating, shows air bubbles in the clot. It is sometimes possible to detect blood moulds of the smaller bronchi.

Pulmonary apoplexy is the result of "blocking" of some branch of the pulmonary artery by a thrombus or an embolus, as frequently occurs in chronic cardiac disease; but blocking or even total obstruction does not necessarily result in hæmorrhage into the corresponding lung area. The infarctions most frequently occur near the surface of the lung, and are oftenest wedge-shaped, with the base toward the periphery. They vary in size from that of a walnut to an orange, and may even fill the greater part of a lobe. They are of dark color, hard, firm, and possess the structural properties of a blood-clot. If the bleeding is not fatal, reëstablishment of the circulation and removal of the clot may occur; more frequently the clot undergoes the usual changes, leaving a fibroid, puckered patch. Again, sloughing may occur, a cavity be formed, and even gangrene result.

The **symptoms** are very indefinite, and the diagnosis resolves itself into a "suspicion" of the existence of an infarct, based upon the occurrence of hæmoptysis in connection with cardiac disease, especially mitral stenosis.

Treatment of Hæmoptysis.—It is necessary to insure quiet in bed, which in the majority of cases is quite sufficient to stop the bleeding; the importance of this simple, common-sense measure cannot be overestimated. The patient, when the circumstances justify it, must be assured that comparatively slight danger exists. The physician must abstain from examination of the chest, especially from percussing it. The usual home-treatment, drinking a solution of a teaspoonful, or two, of common salt in water or very sour lemonade, is not to be commended; it disturbs the stomach and does more harm than good.

When hæmorrhage results from erosion and perforation of the walls of an artery of some size, the blood being raised in large mouthfuls, the outlook is necessarily serious, and little can be done to avert an unfavorable issue. A ligature put around

the leg, or Esmarch's bandage, will temporarily check it, but it is of slight permanent benefit.

It is well to remember that the fainting which is pretty sure to occur sooner or later favors the formation of a thrombus, and may thus assist in saving the patient. Serious danger arises from the accumulation of blood in the bronchial tubes, practically an inundation of the parts; the patient, therefore, should be encouraged to cough up the blood, and opium, which lessens the cough, should under no circumstances be exhibited.

When the bleeding occurs from the bronchial mucous membrane, the indications are absolute quiet and rest in bed and the exhibition of such agents as will reduce blood pressure; for the latter purpose ACONITE, OPIUM and, if necessary, "salts" are most effective; DIGITALIS and alcoholic stimulants are contra-indicated. Ice may be sucked *ad libitum*; the diet must be simple, light and non-stimulating.

Therapeutics.—ARNICA. Blood dark, coagulated; stitching and bruised soreness in the chest.—ACONITE. Great vascular excitement, flushed face, constant cough; sensation of heat in the chest; the blood is bright-red, mixed with mucus; blood coagulates quickly. Anxiety; fear of death.—CACTUS. Much cardiac excitement. Copious hæmorrhage of bright-red blood. Band-like constriction in the chest and about the heart.—HAMAMELIS. Purpura hæmorrhagica; malignant fever. Dark blood.—IPECACUANHA. Expectoration of frothy, bloody mucus; sensation of bubbling in the chest; faint and out of breath; in tubercular cases.—LEDUM PALUSTRE. Bright-red, frothy hæmorrhage. Hæmoptysis "alternating with attacks of rheumatism" (T. F. Allen). Cough violent, spasmodic; pulse strong.—MILLEFOLIUM. Profuse flow of bright-red blood, which is thin; oppression and palpitation; not much cough; blood is raised without cough; "only distinguished from ACONITE by the absence of anxiety." In tuberculosis.—VERATRUM VIRIDE. Intense arterial excitement, with heavy, full pulse; the patient seems calm and indifferent; blood flows in large quantities; it fairly spurts from the mouth.

Consult also ARSENICUM, FERRUM, PHOSPHORUS, BELLADONNA, ERIGERON, RUTA, SANGUINARIA, BRYONIA, SENECIO.

PNEUMONIA.

Lobar (croupous or fibrinous) pneumonia, pneumonitis, lung-fever, is an acute infectious disease, localized in the lungs, but followed by general infection, with high fever, pains in the chest, expectoration of gelatinous, rusty-colored sputum, consolidation of the lung tissue, termination of fever by crisis, and secondary infectious processes.

Ætiology.—Pneumonia is a common disease, in frequency of occurrence ranking next to tuberculosis; statistics show that it constitutes about three per cent., and furnishes a mortality of 6.6 per cent., of all diseases. It shows no preference for any time of life, but is especially fatal in the aged. It attacks men oftener than women. Climate seems to exert slight influence, since pneumonia is found everywhere; in the United States it is more frequent in the South than in the northern states. The season of the year during which it is most prevalent is from December to May, especially February and March. It is evident that severe cold weather, as is had in January, does not in itself especially favor pneumonia, but that a large daily range of temperature and sudden changes are far more important. It is much more frequent among city people than in the country, and a hardy life out-of-doors protects against it; thus, observation shows that soldiers have pneumonia much oftener in garrison than while engaged in active duty in the field, and sailors when on shore rather than on the sea; among washer-women in Paris the death rate from pneumonia was 3.05, while among nuns it reached 7.02, per thousand. Here, as elsewhere, whatever weakens the vigor of the constitution, and thus lessens the power of resistance, becomes a predisposing cause. Hence the alcohol habit, life amidst unhealthful surroundings, disease (especially chronic albuminuria, diabetes, tedious diseases of the nervous system, low and protracted fevers) must be mentioned here. A feature of especial interest is the fact that one attack of pneumonia strongly predisposes to recurrences of the disease.

The common belief that pneumonia is the result "of a cold" is probably incorrect. The contagiousness of the disease is not settled, and the weight of evidence is against it; but it often occurs in an almost epidemic form in certain houses, establishments, and restricted neighborhoods.

The specific cause of pneumonia is now held to be the micrococcus lanceonatus (Fraenkel, 1886, though earlier described by Sternberg). It is lancet-shaped, occurs in pairs (hence diplococcus), sometimes in rows or beads of five or six, or more, elements; in the body, it is also seen encapsulated. It is found in the buccal secretion of healthy persons, and in many parts of the body, as the nose, larynx, Eustachian tubes, pleura, kidneys, etc. It persists for an indefinite time in the saliva of those who have had pneumonia, and is seen in secondary processes, as endocarditis, pleuritis, etc. The view now generally entertained is that the diplococcus enters the lung, sets up a specific inflammation there, producing also a poisonous albumin (pneumotoxin) which, by absorption, causes the constitutional symptoms of the disease; in the course of time, it is held, there is produced in the body a substance (antipneumotoxin) which has the power of neutralizing the effects of the pneumotoxin, the crisis occurring when this stage has been reached.

Morbid Anatomy.—Pneumonia affects the lower portion of one lung, or the entire lung, preferably on the right side, or portions of both lungs, preferably the lower. The stage of *engorgement*, lasting from several hours to several days, is characterized by a congested state of the lung tissue, which is firm, solid, deep-red, and on the surface bathed in a bloody serum. The capillaries are distended, and the air spaces filled with red and white blood corpuscles, granular matter, fibrin and epithelial cells. The inflammatory product in the air spaces and bronchi having reached the maximum of its development, the second stage begins, that of *red* hepatization. The lung tissue is now solid and airless, sinking in water. The surface is dry, brown and somewhat granular; the lung substance friable, so it is easily torn, even under common manipulation. Upon section, granulation is readily seen, the granules representing plugs consisting of inflammatory products which fill the air cells. The smaller bronchi are often filled with fibrinous plugs; infiltration of leucocytes into the interlobular tissues is marked. The affected lobe is increased in size, compressing other parts of the lung, and often showing the indentation of the ribs. The pleura is covered with fibrinous exudation.

The stage of *gray hepatization* consists of degeneration and breaking-up of the exudation preparatory to its removal, in

case of recovery, by the lymphatics. The fibrinous network disappears, red blood corpuscles are no longer seen, and leucocytes abound in the air cells. The parts are bathed in a purulent fluid, and the term "purulent infiltration" naturally suggests itself as descriptive of this state. Resolution consist in the removal of the softened exudate and cell elements by the lymphatics; it may be characterized by the incidental formation of abscesses.

The duration of the different stages varies. The change from red to gray hepatization proceeds with varying rapidity in different parts of the affected lung, so that both types of hepatization may exist at the same time. The unaffected portion of the lung usually is congested or œdematous. The bronchial mucosa, after death, is found congested, but not swollen; the tubes are filled with frothy, serous fluid, and in the affected parts with plugs and even casts. The bronchial glands are swollen, sometimes pulpy. The pleura appears slightly turbid under a thin covering of fibrinous exudate. The heart, especially the right chamber, is distended with firm, solid coagula. Pericarditis, endocarditis and meningitis are sometimes seen; parenchymatous, and other, changes of the liver and kidney are not infrequent; the spleen is frequently enlarged; croupous or diphtheritic inflammation has been observed in other parts (as croupous colitis).

Symptoms.—The onset of the disease is either sudden or marked by indisposition which rarely continues longer than two days. More frequently—in about 90 per cent. of all cases—a severe, intense chill racks the patient for ten to thirty minutes; sometimes the chill is repeated. This is followed at once by a rapidly rising temperature. With the fever, a severe, agonizing and steady pain in the side appears, followed by short, dry, painful cough, with somewhat rapid and restricted breathing. The fever continues, with a fall of one degree or one and one-half degrees in the morning. The other symptoms show no abatement. The patient lies on the affected side or on the back, breathing hurriedly and, often, with much difficulty on account of the severe chest pain; the *alæ nasi* expand with each inspiration; the face looks dark-red, sometimes only on the affected side; the eyes appear bright-red and lustrous; the pulse is full and bounding. The cough is frequent, has a

peculiar metallic ring, and is painful; when obliged to cough, the patient endeavors to find relief of pain by firmly pressing his hand upon the side. The expectoration is at first light and frothy, but soon becomes viscid, tenacious and rust-colored; occasionally it becomes dark, like prune-juice. It indicates inflammatory involvement of the air cells, and is found in no other condition. This state persists until, sometimes as early as the third day from the appearance of the initial chill, oftener from the fifth to the tenth day, a crisis takes place. The fever subsides, with relief of all the symptoms, and, in the absence of complications, convalescence may be considered established. Occasionally defervescence takes place by lysis.

Physical Signs.—*Inspection* shows deficient expansion of the affected side after consolidation has taken place; this is also shown by palpation. Mensuration may demonstrate enlargement of the affected side. *Percussion* in the early stage yields a high-pitched, rather tympanitic note; later the sound becomes dull, flat. *Auscultation* early gives a “harsh, loud, puerile, respiratory murmur” (Stokes) or at the end of each inspiration a fine crackling sound close to the ear; when the patient is directed to draw a long breath, harsh broncho-vesicular sounds are heard. Tubular breathing is heard in the second stage, often intense, and frequently without râles. “It is simply the propagation of the laryngeal and tracheal sounds through the bronchi and the consolidated lung tissue. The permeability of the bronchi is essential to its production. Tubular breathing is absent in certain cases of massive pneumonia in which the larger bronchi are completely filled with exudation” (Osler). Bronchophony, dulness on percussion, and bronchial breathing constitute the three most marked signs of hepatization.

Special Symptoms.—*Fever* may reach its maximum within the first three days, possibly during the first twenty-four hours. The average temperature is from 102° to 103° in the a. m., and 104° in the afternoon of the same day, the height of the temperature usually being in proportion to the intensity of the disease. Defervescence in most cases begins on the seventh day, next in order of frequency on the fifth, sixth, eighth or ninth day. A sudden rise in the temperature means an extension of the pneumonia or some complication. It is especially

significant when occurring during the period of defervescence, and means a possible pleuritis, abscess or, less often, gangrene. A subnormal temperature is unfavorable. If the temperature drops rapidly, possibly heart failure must be anticipated.

The *pulse*, after the chill has passed, is full and bounding, rarely dicrotic, and ranges from 100 to 120; if over 120, it may be considered a danger signal. In old persons it may be small and rapid. The *heart-sounds* are loud and normal, with accentuation, according to some observers, of the second heart-sound over the pulmonary artery. Heart failure, it is thought, occurs here as in diphtheria from the constitutional effects of the toxalbumin, with increasing smallness and rapidity of the pulse, followed by cessation of the heart's action. Embryocardia is often noticed in connection with heart failure. This accident is likely to occur during rapid defervescence or on the day before defervescence becomes established, and when there is chronic endocarditis. The blood is rich in fibrin; leucocytosis is usually present; in fact, Osler states that absence of leucocytes means danger of malignant pneumonia. Diplococci are rarely seen in the blood under the microscope. *Pain* in the side, usually at the nipple, in the axillary region, or in the flank of the affected side, less often below the shoulder blade, is early and severe; it may disappear after three or four days; and may be trifling or wholly absent in old people. It is severe, "steady," aggravated from coughing and breathing. *Breathing* is superficial and rapid, from forty to sixty respirations to the minute in adults and from fifty to seventy in children, the result of nervous influence, fever, loss of function in the affected tissues, and pain. The inspirations are short and superficial; the expirations are accompanied with a half-groan or "grunt." The ratio between pulse and respiration is one to two, and more. *Cough* is short, frequent, painful. Exceptionally it is deferred until resolution begins. In children and old people it may be absent throughout. The expectoration is exceedingly tenacious, and often must be removed from the lips by a napkin; later it becomes more liquid. It consists of the contents of the inflamed air cells, and has the rusty-colored, and in "low" cases the "prune-juice," appearance already described. *Labial herpes* are very common. The *tongue* is usually furred white; continued moisture is a good sign. The *urine*

is of high color, high specific gravity, dense, of acid reaction. Urea and uric acid are increased, the chlorides lessened. If the kidneys are involved, casts and albumin in moderate amount are present; bile pigments are seen in jaundice.

Cerebral symptoms consist of headache and delirium. Headache of a dull, heavy character is common, but delirium is rare, save in children, of whom a large number are delirious and may have convulsions, and in drunkards, who may present the symptoms of delirium tremens. Healthy adults usually retain consciousness throughout, but delirium in such cases, when it occurs, is likely to be violent and may result in permanent insanity. Delirium in either case is usually accompanied with high fever.

Complications.—*Pleurisy*, more or less pronounced, exists when pneumonia affects the periphery of the lung; sometimes its symptoms overshadow the pneumonia (pleuro-pneumonia). If it occurs as a clear-cut complication, it usually appears on the sixth or seventh day. It is characterized by copious effusion, rich in fibrin, and empyema; breathing is feeble; there are no râles; continued or extended dulness at the base. *Catarrhal Bronchitis*, affecting the larger bronchi of both lungs, is not infrequent in the pneumonia of epidemic influenza. There is copious mucous expectoration, abundant coarse râles, sibilant and sonorous breathing, great dyspnoea, elevation of temperature, venous congestion, tendency to heart-failure. *Acute pericarditis* is observed in connection with double pneumonia or pneumonia of the left side; often in children. It is not necessarily fatal. Symptoms: Increase of dyspnoea, increasing feebleness of the pulse, gradual suppression of heart-sounds. *Acute endocarditis* is not uncommon, but is difficult of recognition. It occurs oftener in the left heart than in the right and when there is a history of valvular disease. According to Osler, it may be suspected in cases in which the fever is protracted and irregular; when signs of septic mischief arise, such as chills and sweats; when embolic phenomena appear. Fatty degeneration of the *myocardium* has been noticed. *Meningitis* is not a frequent, but a very serious, complication. It may not be recognized, except when it involves the base of the brain. There may be embolism of the cerebral arteries, with hemiplegia. Other and rare complications seen are:

Bright's disease (pneumonia occurring in persons suffering from chronic nephritis usually proves fatal), croupous colitis, croupous gastritis, arthritis, parotitis.

Recurrences of pneumonia are frequent, and cases in which the patient has had the disease six or eight times are not uncommon; relapses are so rare that the possibility of their occurrence is denied by many.

Clinical Varieties and Peculiarities of Pneumonia.—Various terms are used in connection with pneumonia to describe some clinical peculiarity, as “adynamic,” “bilious,” “malarial,” “rheumatic,” etc. The term “typhoid” pneumonia must not be used interchangeably with “pneumo-typhus,” a typhoid fever beginning with a pneumonia. *Larval* pneumonia refers to cases occurring during epidemics of pneumonia which have mild initial symptoms of the disease without clearly pronounced local signs. *Migratory* (or creeping) pneumonia attacks first one lobe, then the other; the extension of the disease is marked by violent exacerbation of all the symptoms.

Double pneumonia means a simultaneous involvement of both lungs; it is characterized by decided increase of the difficulty in breathing and probability of fatal termination. *Massive* pneumonia means a pneumonia with involvement of both air cells and bronchi of the entire lobe or lung. The physical signs are like those of pleurisy with effusion. There is neither fremitus nor tubular breathing; absolute flatness on percussion. Molds of the bronchi may be expectorated. The mortality is great. *Epidemics* of pneumonia are usually attended with a high mortality rate. The clinical history presents no variation from the regular form, but in nearly every epidemic some special feature common to all cases is emphasized; thus in some epidemics diarrhœa is prominent; in others, cardiac complications or cerebral symptoms are very pronounced. The so-called *infectious* cases present an intensity of constitutional manifestations which is out of proportion to the local affection, and strongly suggests toxic action. The temperature is high, the tongue dry, the action of the heart rapid and weak, brain symptoms pronounced, and the fatality great.

The following facts are of interest: In *infants*, cerebral symptoms and convulsions are common, even early in the course of the disease; the apices of the lungs are involved much oftener

than in adults; there is very commonly an entire absence of the characteristic rust-colored sputum. In the *aged* all the symptoms and physical signs may be vague, with hardly any chill, fever, cough, expectoration, pain or difficulty of breathing. The prostration, however, is remarkable, and death may occur suddenly even in apparently light cases. In *drunkards* there is the striking predominance of brain-symptoms and delirium already described; the onset is usually insidious and the fever slight. In *diabetes* the course is rapid and severe, often ending in abscess or gangrene. Usually involvement of the *apices* occurs when there is great adynamia; chiefly in infants; cerebral symptoms are severe; cough and expectoration often slight.

Prognosis.—Pneumonia in private practice has proved fatal in from 20 to 25 per cent. of all the cases, in hospital practice in from 18 to 34 per cent. of all the cases. Infants and healthy adults usually recover; in persons of feeble health, old people, and those vitiated by bad habits, particularly drunkards, the prognosis is very serious. The bearing of complications upon the case has been discussed; it may be added that meningitis almost always proves fatal, and that abscess or gangrene of the lung and endocarditis are exceedingly serious. Rapid breathing, muttering delirium, dryness of the tongue, expectoration of thin, "prune-juice" colored sputa and failing pulse indicate the approach of death. Death almost always occurs from heart-failure, sometimes from general poisoning, very rarely from thrombosis of the coronary arteries.

Termination.—Resolution may occur promptly, all the physical signs, save a moderate amount of dulness, disappearing within ten to fourteen days. In other cases it is indefinitely delayed, even for a period of months, requiring unceasing care on part of the physician. Pulmonary abscess and gangrene may occur. The former is recognized by the severity of the constitutional symptoms, cavernous signs, and the sudden discharge, with coughing, of purulent and highly offensive matter. Chronic interstitial pneumonia often follows lobar pneumonia.

Diagnosis.—The symptoms of pneumonia are so clear-cut that difficulties in recognizing the disease can exist in exceptional cases only, and then these are of a character which demands for their solution exhaustive and careful study and

highly cultivated judgment. Thus a pneumonia may easily be overlooked when it occurs in an intercurrent form or in the course of chronic tuberculous or cardiac disease, in diabetes, albuminuria or cancer. In the aged and in infants the symptoms are so vague that only post-mortem evidence may determine the cause of death. Again, violent brain symptoms may wholly mask a pneumonia of infants or of drunkards. A mistake may also be made between a pneumo-typhus and a pneumonia with profound constitutional poisoning quickly assuming a "typhoid" form.

Treatment.—The patient must be kept, as quietly as possible, in a room the temperature of which is to be maintained permanently at from 70° to 72° F. It is the part of wisdom not to allow the patient to leave his room and to move about the house until the temperature has been normal for a few days and all the exudate removed. Pain may justify the application of large poultices to the affected side, and possibly the use of morphia; the latter is rarely necessary, for the indicated remedy is capable of accomplishing more permanent good in this direction than does the morphine. Ice-bags on the affected side and cold water have long been popular in Europe, and the treatment is now recommended by American physicians. To lower the temperature, frequent sponging in tepid water is helpful; if the temperature rises above 103.5°, the hot bath, at 70° F., must be employed, and repeated as often as necessary, with proper precautions not to have the patient take cold or become exhausted. Inhalation of oxygen relieves excessive dyspnoea and threatening asphyxia. Alcoholic stimulants may be exhibited when adynamia is marked and the pulse becomes weak, rapid and unsteady; this applies particularly to the aged. Generally speaking, the beneficial effects of alcohol are exaggerated. The diet must be light, nourishing and of a character that will not produce flatulency. Milk, milk-whey, broths, beef-juice, eggs and raw scraped beef meet the demands of the case. Cool water, soda water or Apollinaris may be taken freely.

Therapeutics.—Although writers of the dominant school practically affirm the utter uselessness of remedial agents, so far as it concerns their power to cut short the course of pneumonia or to exert a modifying effect upon it, the exhibition of

the indicated remedy, selected upon homœopathic principles, does nevertheless cut short and modify the course of pneumonia, reduce the gravity of complications, and materially lessen the death rate.

In the beginning the choice lies between ACONITE and VERATRUM VIRIDE, not only because these remedies depress the pulse, but because of their close homœopathic relationship to the disease.—ACONITE must be given during the stage of engorgement and great arterial excitement; when this stage has passed, it is no longer of use. In addition to its general characteristics it covers: dull pressure and weight on the chest; stitches in the chest during inspiration and motion; dry, racking cough; tenacious, bloody expectoration.—VERATRUM VIRIDE (in the tincture or 1x). Great arterial excitement; pulse hard and full; great dyspnœa; intense pulmonary congestion; livid face; dry, hacking cough, also with blood-streaked expectoration.

The disease having fully localized, the choice of remedies will probably lie between the following: BRYONIA, PHOSPHORUS, SANGUINARIA, IODINE, MERCURY, TARTAR EMETIC, CHELIDONIUM.—BRYONIA is valuable during the stage of hepatization, and has here been used with brilliant success, for the better part of a century, by our best clinicians. It is especially useful when the pleura is involved. Sharp pains, better from lying on the affected side and from pressure and warmth; keenly aggravated from motion, coughing and breathing. Either no thirst or great thirst for copious draughts of cold water. Constipation.—PHOSPHORUS. Stage of hepatization, without the pleuritic symptoms of BRYONIA; especially helpful in thin, tall, spare persons who constitutionally meet the individuality of the remedy; the fever symptoms are not marked, and may have subsided. Great oppression of the chest. Sputa rust-colored. Typhoid, adynamic state.—SANGUINARIA. Right lung affected (?). Tough, rust-colored sputa; pain in the chest not intense; feels better when lying on the back; pulse quick, feeble; extreme dyspnœa. "Face and extremities cold; with circumscribed redness and burning heat of the cheeks" (Raue). Mild inclination to typhoid state.—IODUM. Lacks the anxiety of ACONITE and the sticking pains of BRYONIA, but it has the high fever of both. Stage of hepatization. Involvement of the

apices. Scrofulous diathesis. Has made an excellent clinical record.—MERCURY. Rather loose cough; worse in the night, from lying on the right side. Copious sticky sweating at night, like night-sweat. Bilious symptoms; jaundice. The fever is continuous, but not intense; dyspnœa long-continued; tongue yellow, then dry; urine scanty. Pneumonia of children.—TARTAR EMETIC. Especially useful in the pneumonia of old people, of persons of feeble vitality; also at the close of the third stage. There is considerable dyspnœa, with wheezing and rattling, and lack of sufficient energy to expel the bronchial contents. Livid, pale face; rapid, feeble pulse; cool, moist skin. Threatening paralysis of the lungs. Drunkards.—CHELIDONIUM. Has proved of service in right-sided pneumonia, with symptoms of hepatic disorder, pain under the right shoulder-blade; rattling in the chest, with inability to expectorate.

If there is *heart failure*: CACTUS, STROPHANTHUS, DIGITALIS. *Typhoid state*: BAPTISIA, RHUS TOXICODENDRON, ARSENICUM, OPIUM, PHOSPHORUS, CARBO VEGETABILIS. If *dyspnœa* is excessive: GRINDELIA ROBUSTA, QUEBRACHO, CARBO VEGETABILIS. If resolution has commenced, but is tardy, the case becoming almost chronic: ARSENICUM IODATUM, CALCAREA IODATA, KALI CARBONICUM, KALI MURIATICUM, LYCOPODIUM, SILICA, SULPHUR.

CHRONIC INTERSTITIAL PNEUMONIA.

A chronic inflammation of the connective tissue framework of the lungs and of the walls of the air cells, resulting in a gradual substitution of connective tissue for the normal lung. The terms "local" and "diffuse" are used to designate the extent of the area involved, the disease sometimes being restricted to a limited space, again affecting the entire lung or both lungs.

Ætiology.—Localized interstitial pneumonia is almost constantly present in restricted inflammatory processes, as in tuberculosis, phthisis, abscesses, hydatids, gummata, or in limited inflammation (thickening) of the pleura. The diffuse form may follow, rarely, acute fibrinous pneumonia, chronic broncho-pneumonia, chronic pleuritis, chronic bronchitis, or the long-continued inhalation of the dust of coal, stone, or metals (pneumonokoniosis).

Morbid Anatomy.—Delafield gives the following: “If it follow acute lobar pneumonia with the production of new connective tissue, one lobe or one entire lung is covered with pleuritic adhesions; it is small, smooth, and dense; the air spaces and small bronchi are obliterated by the new connective tissue. Some of the bronchi may be dilated. If it be consequent upon broncho-pneumonia, one or more lobes are studded with fibrous nodules or are converted into dense fibrous tissue. The pleura is thickened, the bronchi are inflamed and often dilated. If it be concomitant of the thickening of the pleura, bands of connective tissue extend from the pleura into the lung; there is inflammation of the bronchi and often dilatation. If it follow chronic bronchitis, there are fibrous nodules around the bronchi, with more or less diffuse connective tissue. If it be due to the inhalation of the dust of coal or stone, we find in both lungs fibrous peribronchitic nodules and diffuse connective tissue. In most of the cases the portions of lung exempt from the interstitial pneumonia are emphysematous.”

Symptoms.—The symptoms are such as belong to the pathological changes going on in the lung, and disappear when these have been completed, often leaving the patient in a state of fairly good health. More or less cough is present from the beginning, and increases both in severity and frequency as the disease advances. There is expectoration of mucus, then muco-pus, exceptionally fetid or tinged with blood; hæmoptysis may occur. A certain amount of dyspnoea is felt throughout, noticed in some cases only when the patient ascends an elevation; others suffer from it perpetually. When there is much bronchial dilatation the case presents symptoms of bronchiectasis, especially characteristic cough at long intervals with copious raising of muco-pus. Pain in the affected lung may not be complained of, but the patient loses flesh and strength. Fever occurs only during acute bronchial exacerbations. The larynx is not involved. Colliquative diarrhœa does not complicate the case.

Physical signs consist of retraction and immobility of the affected side, with enlargement of the opposite side. The heart is displaced by the traction exerted upon it; the shoulders become stooped, and there may be lateral spinal curvature. The sounds elicited by percussion vary with the extent of the bron-

chial involvement; they may be dull at the base or apex, tympanitic or amphoric elsewhere. Tympanitic resonance is usual on the unaffected side. Auscultation yields the sounds of various stages of bronchial inflammation, dilatation or consolidation.

The duration of the disease is chronic, and death usually results from heart failure or hæmorrhage, rarely from amyloid degeneration.

The diagnosis is comparatively easy; the presence of tubercle-bacilli must be established, if possible, to determine the origin of the disease.

Pneumonokoniosis is due to inhalation of dust in the pursuit of such occupations as coal-mining (anthracosis), marble- or stone-cutting (chalicosis or stone-cutter's phthisis), working in metals, as grinding knives or scissors (siderosis and grinders' rot). The lungs are studded with fibrinous peribronchitic nodules, from the size of a pea to that of a hazel nut, and larger, usually surrounded by firmly consolidated, grayish, crepitant tissues, a small bronchus forming the center of the diseased area. These may coalesce and form large, firm scirrhous masses. There is chronic bronchitis with emphysema, with eventual softening and necrosis. The symptoms are very much alike, the most interesting feature of the affection consisting of the extended period, often a long series of years, of continuous exposure to these irritating substances with the enjoyment of reasonably good health. When the patient finally breaks down, general and rapid failure of health and strength is observed, with cough and muco-purulent expectoration, usually of the color of the substance which has been inhaled.

The treatment of chronic interstitial pneumonia consists of careful attention to the diet of the patient, to his general health, and, if within reach, a change of climate. The choice of medicinal agents is guided by symptomatic indications (see Chronic Bronchitis).

BRONCHO-PNEUMONIA.

Broncho-pneumonia, lobular pneumonia, capillary bronchitis, sometimes still called catarrhal pneumonia, is an inflam-

mation which involves the walls of the terminal bronchi and of the air vesicles which surround them.

Ætiology.—The disease is hardly ever primary, but usually occurs in a secondary form with measles, diphtheria, whooping-cough, scarlet fever, and other acute infectious diseases of childhood, constituting one of their most dangerous complications and sequels. In many cases it is excited by the presence of the bacillus tuberculosis. Cases occur (as after operations on the nose, mouth or larynx, or in laryngeal or œsophageal cancer, or as the effect of cerebral disease, such as apoplexy or uræmic poisoning) where there is great or complete loss of sensitiveness of the larynx, and small particles of food are allowed to enter the lungs, the presence of which excites intense inflammation (deglutition pneumonia). The same effect is produced by the entrance into the lung of blood from a hæmoptysis or by the aspiration of the purulent contents of a cavity in the lung (aspiration pneumonia). In adults the affection is comparatively rare, though it may occur as a complication of typhoid fever; aged persons often suffer from it in the course of debilitating acute or chronic diseases. Extremes of life and physical debility are powerful predisposing causes. Children of less than five years of age are especially subject to broncho-pneumonia, particularly those of weak constitution, suffering from rickets or diarrhœa, and raised among insanitary surroundings.

Morbid Anatomy.—The lung is abnormally full and firm; the walls of the small bronchi and bronchioles, usually of one lung or of one lobe, are thickened; the affected bronchi are surrounded by consolidated lung tissue, forming solid nodular bodies, rarely larger than a pea; irregular areas of consolidated tissue are scattered throughout the affected lung. Areas of collapsed tissue, greatly varying in extent, and sometimes involving a considerable portion of the lung tissue, are seen. The pleura often is coated with fibrin. The bronchial glands are usually inflamed and swollen. Upon section the lung appears dark-red and rich in blood. Isolated patches of affected tissue, of light color and usually separated by areas of sound tissue, project above the level of the section. Osler describes as follows the appearance of an isolated patch of broncho-pneumonia: (a) A dilated central bronchiole full of tenacious, purulent

mucus. (b) Surrounding the bronchus from 3 to 5 mm., or even more, is an area of grayish-red consolidation, usually elevated above the surface and firm to the touch. It may present a perfectly smooth surface or be distinctly granular. If the disease is far advanced, small grayish-white points may be seen, i. e., drops of purulent matter which may be squeezed out. A section in the axis of the lobule may present a somewhat grape-like arrangement, the stalk and the stems representing the bronchioles and the alveolar passages filled with yellowish or grayish-white pus, while surrounding them is a reddish-brown, hepatized tissue. (c) In the immediate neighborhood of this peribronchial inflammation the tissue is dark, smooth, airless, and sunken in (splenization), representing tissue in the early stage of inflammation. In some cases the nodules of consolidated tissue are grayish in color and the air cells are filled with a grayish, muco-purulent material.

The affected bronchus is filled with a plug of exudation (leucocytes and swollen epithelium), the involved air cells containing leucocytes and swollen endothelium. Various micro-organisms are present (micrococcus lanceolatus, streptococcus pyogenes, bacillus pneumoniae, staphylococcus aureus et albus, Klebs-Loeffler bacillus).

As stated by Delafield, the essential or constant lesions consist of the productive inflammation of the walls of the bronchi and of the air spaces immediately surrounding the inflamed bronchi; the accessory lesions are: catarrhal inflammation of the bronchial mucosa; an exudative inflammation of the air-spaces, resulting in their cavities being filled with fibrin, pus and epithelium, and consolidation; exudative inflammation of the pleura; dilatation of the affected bronchi; areas of atelectasis; inflammation (simple or tubercular) of the bronchial glands.

Symptoms.—The onset of the disease is rarely sudden. Occurring in connection with acute infectious diseases, especially measles and whooping-cough, there is usually an increase of fever, sometimes preceded by chilliness, with cough, rapid pulse and quick, superficial breathing. In severe cases the symptoms are more pronounced, and convulsions and delirium may be present. The fever continues, with a temperature ranging from 102° to 104° F. As in the bronchitis and pneumonia of chil-

dren, the fever often assumes a distinctly remittent type, with a morning temperature of 99° to 100° F., and an evening temperature which may reach 105° F. The height of the temperature is in proportion to the intensity of the disease, and thus becomes an important item in the prognosis of the case; but it must be borne in mind that recovery often takes place when the temperature has been persistently high, while death may occur in cases where the fever and temperature were of moderate range. The *pulse* is rapid, from 120 to 160, and often becomes thready; the skin is dry and pungent. *Respiration* is rapid, shallow and unsatisfactory, ranging from 40 to 80 a minute. *Dyspnœa* is a common symptom; it is severe, progressive, and accompanied with signs of deficient aëration of the blood (blueness of the finger tips). A sense of impending asphyxiation greatly distresses the child, until in the fatal cases carbonic acid poisoning affects the nerve centres. If the latter takes place, the respiratory effort becomes indifferent, the cough subsides, the patient grows livid and drowsy, the bronchial tubes fill with mucus, and death results from paralysis of the heart. (*Suffocative catarrh.*) *Cough* is usually hard, sometimes painful, and due chiefly to bronchial catarrh; expectorated matter is swallowed. The face is flushed; the tongue coated or dry; the patient is sleepless and restless; urine contains traces of albumin and casts if the kidneys are acutely involved. In very young infants it may be difficult to recognize the disease, since there may be an entire absence of cough and of physical signs, the chief symptoms consisting of more or less fever, prostration and quick, superficial breathing. Such cases may prove rapidly fatal. In other instances the cerebral symptoms (convulsions, delirium, stupor) at the onset of the disease are so severe as to closely resemble acute or tubercular meningitis; but they rapidly improve on the appearance of the pulmonary affection.

The clinical history of broncho-pneumonia in adults differs from the description given chiefly in the infrequency of cerebral symptoms, in the prominence of catarrhal bronchitis, and in the resemblance of the affection to lobar pneumonia, with the expectoration of blood-stained, purulent matter.

Physical Signs.—In the early stage auscultation usually yields fine râles at the bases of the lungs or throughout the

lungs; all the signs of catarrhal bronchitis may be present. If the broncho-pneumonia is quite limited in extent, distinctive signs may be almost wholly wanting; if the pneumonia is extensive and large areas of consolidated tissue exist, there will be dullness on percussion, bronchial breathing and bronchophony. Tubular breathing is especially pronounced when many foci are scattered over the greater part of the lobe.

The duration and course of broncho-pneumonia vary. In the severe form seen among young infants, death frequently occurs within two or three days; the greater number of fatal cases die within two weeks, but often the case drags along for six, seven or eight weeks. Usually, in favorable cases the constitutional symptoms persist for one or two weeks after the force of the local disease is broken, much depending on the vigor of the child and its constitutional bias. If recovery is very protracted, especially when the apices were involved, there is always reason to fear possible tuberculous tendency. Imperfect recoveries are common. The child survives the acute attack, but a chronic, low inflammatory action persists, with poor appetite and loss of flesh and strength, not necessarily preventing an eventual recovery, but more often leaving consolidation of some portion of the lung, or a chronic interstitial pneumonia, or affording a focus for general tuberculous infection; sometimes death occurs from exhaustion. Suppuration and gangrene frequently result in deglutition and aspiration pneumonia.

Diagnosis.—*Lobar pneumonia* and broncho-pneumonia have many points of similarity, and when the latter is characterized by the presence of many foci or extensive consolidation involving the greater part of one lobe, differentiation may prove very difficult. Broncho-pneumonia, however, usually attacks children during the first five years of life, while lobar pneumonia is more common from the fifth to the fifteenth year; the former is almost always bilateral, the latter unilateral; the onset of broncho-pneumonia usually is gradual, that of lobar pneumonia sudden. The course also differs, lobar pneumonia terminating on the eighth or tenth day, while in broncho-pneumonia the duration of the disease is longer and the resolution slower. The character of the expectoration in broncho-pneumonia, resembling that of bronchitis, is also of value. The question often

arises whether a case is one of simple or of tuberculous broncho-pneumonia. In adults this applies to cases where the invasion is slow, the fever moderate, the cough persistent, with emaciation, weakness, nightly exacerbations and night sweats. A positive diagnosis here rests upon the recognition of the bacilli of tuberculosis. In children the existence of extensive involvement of the upper portions of the lung, especially of the apices, with tardy recovery, warrants fear of tuberculous disease.

Prognosis.—The prognosis must always be guarded. If the disease is secondary to an acute affection, as measles or whooping-cough, the chances are much better than when it occurs in infants who are exhausted by some long-continued fever or constitutional disease. Tough, wiry children may survive attacks which prove fatal in large, fleshy infants. There is a form of broncho-pneumonia in adults, characterized by great suddenness of onset, rapid elevation of temperature, severe chest-pain, great prostration, badly embarrassed breathing, and symptoms pointing toward an extensive pneumonia, which runs a rather rapid course and often proves fatal. The prognosis in deglutition- and aspiration-pneumonia is always grave.

Treatment.—The sick-room must be kept at an even temperature (65° to 70°), and the air charged with vapor. Cold water should be drunk freely. The diet must be both light and nourishing, and will usually consist of milk, malted milk, egg-albumin dissolved in water and slightly sweetened, and broths. If bronchitis is general, hot fomentations and poultices may be applied over the chest, to be removed at short intervals and with due precautions to avoid taking cold; the cotton-batting jacket is also useful. When cerebral symptoms are pronounced, the wet pack or bath in agreeably warm water, gradually reduced to 80° or 76° , is far better than bromides, phenacetine or opium. Emetics (wine of ipecacuanha, tartar emetic) may be necessary if the child cannot raise the abundant accumulation in the tubes, but should not be used hastily or recklessly. Inhalations of oxygen are often of service in the later stage. Alcoholic stimulants may be exhibited in adults, in moderate doses, but are absolutely useless and positively dangerous in young children and infants. If the recovery is tedious, cod-

liver oil may prove beneficial; a change of air frequently becomes imperative.

The *remedies* employed are those discussed under bronchitis and lobar pneumonia.—TARTAR EMETIC is especially useful in children.

EMPHYSEMA.

The term "emphysema" means a dilatation or distension with gas or air. Applied to the lung, emphysema may be interlobular or vesicular.

Interlobular emphysema results from the rupture of one or more air vesicles, forcing the air into the connective tissue between the lobules, oftenest near the apices, and forming pouches of various size. The rupture is usually the result of a violent strain suddenly put upon the walls of the air vesicles, such as might arise from the sudden inspiration of a large amount of air and its forcible retention by the closure of the glottis or from a strain made in heavy lifting, defecation, during labor, violent paroxysms of coughing, etc. It often occurs in the broncho-pneumonia of young children. Recognition during life, from symptoms or physical signs, is exceedingly difficult. The anatomical changes consist of inflation of the connective tissue septa with air, and compression of the lung tissue proper. Exceptionally the air, through the mediastinum, enters the connective tissue of the neck and thoracic wall.

Vesicular emphysema consists of dilatation of the air vesicles from an excess or over-accumulation of air in them. The air vesicles eventually coalesce, effacing the interstitial tissue and its blood vessels, and thus seriously interfere with the proper nutrition of the lung.

(a) Compensatory emphysema results when a portion of the lung is compelled to do extra work because of the incapacity of some other portion to carry on its function. The condition, at first purely physiological, eventually becomes pathological. It is best seen in cirrhosis of the lung and in broncho-pneumonia.

(b) Atrophic or senile emphysema is a feature of senile degeneration, atrophy of the alveolar walls resulting in enlargement of the air spaces. It is an expression and result of general

atrophy of the lung substance. The chest is small, the ribs are set obliquely, and the appearance of the patient is old and withered. The condition is incurable.

(c) Hypertrophic or substantive emphysema is by far the most important form. Its ætiology must take cognizance of two factors: (1) high pressure within the air cells and (2) weakness, congenital or acquired, of the lung tissue. This pressure is more likely to be intensified during expiration. "In all straining efforts and violent attacks of coughing the glottis is closed and the chest walls are strongly compressed by muscular efforts, so that the strain is thrown upon those parts of the lungs least protected, as the apices and anterior margins, in which we always find the emphysema most advanced. The sternum and costal cartilages gradually yield to the heightened intrathoracic pressure and are, in advanced cases, pushed forward, giving the characteristic rotundity to the thorax. The cartilages gradually become calcified." (Osler.) For the reasons stated, bronchitis and whooping-cough are frequently associated with emphysema, and certain occupations, as glass-blowing and playing on wind-instruments, are important ætiological factors. Hereditary tendency undoubtedly exists; Louis found that of twenty-eight cases carefully studied, in eighteen cases one or both parents had emphysema pulmonum.

Morbid Anatomy.—Both lungs are usually increased in size, have a downy, feathery feel, and pit on pressure; the thorax is large, barrel-shaped; the cartilages are calcified. The dilatation of air spaces and vesicles differs in degree, and, according to clinical evidence, the degree of dilatation does not determine the severity of the emphysema. In some cases the enlarged air vesicles can easily be seen beneath the pleura, and, if large, may project from the free margins as large, irregular bullæ. There is gradual disappearance of the capillary net work of the alveolar walls, with atrophy; loss of elastic tissue is an essential feature of the lesion. Some writers attach much importance to "holes" with sharp-cut edges in the walls of the air-spaces, between the capillaries. Dilatation and hypertrophy of the right ventricle are common, and venous congestion in more distant parts (pia mater, stomach, kidneys, intestines) occurs when the disease is advanced. Intercurrent attacks of bronchitis are frequent, with occasional bronchiectasis.

Symptoms.—Emphysema may exist for a long time without causing appreciable annoyance or symptoms. *Dyspnœa* upon exertion is, however, likely to be present early, and if in young children difficulty of breathing invariably results from running or playing, or from any exertion, the cause should be carefully investigated. In more advanced cases this symptom may become a source of great affliction, especially so since it is sure to be much intensified from recurring attacks of bronchitis and from indigestion. In some cases frequent and severe paroxysms of asthma are a conspicuous feature. *Bronchitis*, in repeated attacks of an acute character or in the chronic form, accompanies all cases, presenting its own train of symptoms, and at times almost wholly overshadowing all the other symptoms. The influence of season upon the frequency and severity of the cough shows itself here as in bronchitis. *Cyanosis* is pronounced, and is peculiar in that it does not interfere with the patient's ability to be about. Attention has been called to the fact that in any other disease of the lungs or heart capable of causing the same degree of cyanosis, the patient would surely be in bed and suffering intensely. In due course of time the *cardiac* symptoms assume a grave aspect; dilatation occurs; exhaustion becomes marked; the stomach, intestines, liver and kidneys suffer from venous congestion, and finally anasarca results.

Physical Signs.—Inspection yields important results. In light cases no changes are observed, but when advanced, a peculiar barrel-shaped appearance of the thorax is noticed, which depends upon a great increase of the antero-posterior over the lateral diameter of the chest. There is also widening of the intercostal spaces, most pronounced in the hypochondriac region. The clavicles are prominent; the sternal fossa deep; the neck appears shortened; the back is rounded from an exaggeration of the spinal curvature. If *dyspnœa* is great, the muscles which are involved in the respiratory act are abnormally large. The chest itself moves but slightly, even during deep respiration.

Palpation shows feeble vocal fremitus, distinct pulsation in the epigastrium, slight apex beat. *Percussion* yields hyperresonance, almost drum-like, tympanitic. *Auscultation* reveals feeble râles. Usually the expiratory sound is prolonged, wheezy, harsh, with coarse and sibilant râles; sometimes both inspira-

tory and expiratory sounds are exaggerated, loud, high-pitched. In advanced cases there is tricuspid regurgitant murmur.

The *course* of the disease is chronic, with frequent periods of exaggeration from attacks of bronchitis and asthma, and a decided down-hill tendency, death eventually, sometimes after many years, taking place from complications or from intercurrent disease.

The prognosis, except in light cases where no structural changes have occurred, is unfavorable.

Treatment must aim to improve by all means possible the general health of the patient, maintain digestion and assimilation, relieve the dyspnoea, control the bronchial irritation, and meet other emergencies as they arise. To this end a well regulated, open-air life, with an abundance of good, easily digested food and abstinence from alcohol, tobacco and saccharine and starchy foods are highly beneficial. Fats are recommended. Compressed air, systematically and perseveringly used, has proved of benefit. The bronchitis and dyspnoea must be managed according to the indications of the case. When the dyspnoea is caused by the contraction of the small arteries, amyl nitrite, nitro-glycerine, or chloral hydrate often relieve. All violent exertion of any kind must be avoided.

Remedies are to be selected from symptomatic indications, and are practically those of bronchitis and asthma, which chapters consult. E. M. Hale claims that COCA and QUEBRACHO are the only two remedies which afford continuous relief. Of the former, he gives teaspoonful doses of the tincture; of the latter, 10 to 15 drops of the tincture or one grain of the solid extract, or $\frac{1}{30}$ of a grain of aspidospermine.

ABSCESS OF THE LUNG.

Pulmonary abscess may follow pneumonia, but is rare; it is frequent in deglutition and aspiration pneumonia. The abscess of lobar or lobular pneumonia is usually small and the character of the pus offensive, though very much less so than the odor of pulmonary gangrene or fetid bronchitis. This rule, however, has exceptions. In two cases seen within the last few years, both following lobar pneumonia, the abscesses were

large and the contents horribly offensive. It is not always easy to recognize the formation of an abscess, for, if deep-seated, no reliable physical signs may be detected and the exacerbation of the general symptoms presents nothing characteristic; the sudden raising of a considerable amount of pus, containing fragments of lung tissue, with the physical signs of a cavity remaining, clears the diagnosis.

Metastatic or embolic pulmonary abscesses are common in pyæmia, as the result of infection by emboli. They are rarely recognized, for the local symptoms are overshadowed by those of the constitutional disease. They are usually superficial, near the pleura, at first grayish-red and firm, surrounded by an areola of intense redness; the abscess is well defined, and perforation, often resulting in pneumo-thorax, is likely to result.

Other causes are chronic pulmonary tuberculosis and injuries of the lung-tissue from without, as from foreign bodies or from perforation of an abscess without (abscess of the liver perforating into the right lung).

The prognosis is always serious and recoveries rare, save as the abscess is superficial and may thus be opened and drained. The remedies are those symptomatically indicated, the choice probably lying between ARSENICUM ALBUM, CHININUM ARSEN., and SILICA. The two cases to which reference has been made recovered under ARSENICUM ALBUM 3x, with occasional doses of CHINA θ , a generous diet, and, in one case, the generous use of old California Port Wine.

GANGRENE OF THE LUNGS.

The term "gangrene," here as elsewhere, denotes putrefaction or desiccation following the death of a part of the living organism. It occurs as a sequence of lobar pneumonia, especially in greatly debilitated and in diabetic subjects; as a termination of aspiration pneumonia, including perforation of œsophageal cancer into the lungs or a bronchus; in bronchiectasis, from the foulness of retained secretion; in embolism of the pulmonary artery, either simple or derived from some necrosed part; as an expression of great debility or cachexia. To the latter cause is due the comparative frequency of pulmonary gangrene in drunkards and lunatics and in children suffering from eruptive

fevers and cancrum oris. The affection may be diffuse or circumscribed.

Morbid Anatomy.—The affected part of the lung is of a dark, dirty olive or greenish-brown color and of distinctly gangrenous odor. “When scattered patches of gangrene occur, there is often in one part a solid mass of greenish lung-tissue, and in another a central sloughy gangrenous cavity, surrounded by a broad rim of soft, infiltrated lung. The seat of circumscribed gangrene is usually the periphery of the lung and the lower lobes. In diffuse gangrene the whole of one lung is sometimes involved. The pulmonary tissue is then converted into a black, putrid substance, saturated with blackish, purulent fluid; or the gangrenous part merges gradually into œdematous or hepatized tissue” (E. Symes Thompson). *Bronchitis* is commonly present; pleural involvement, resulting in pyopneumothorax, occasionally occurs. There may be plugging of the bronchial or pulmonary arteries.

Symptoms.—The characteristic and only reliable diagnostic symptom is the discharge from the gangrenous mass. It is horribly offensive, the fetor communicating itself to the breath of the patient, and rendering presence in the sick-room almost unendurable. This arises from communication between the gangrenous cavity and bronchial tube; if no such communication exists, as in cases of limited involvement, there is no odor, and the existence of the affection may not be suspected during life. The discharge separates into three layers: a heavy, greenish-brown sediment; a thinner, darkish brown middle layer; and a superficial frothy top layer. Shreds of tissue, granular matter, fatty crystals, bacteria, pigment, blood and leptothrix are easily seen under the microscope. There is usually moderate fever, rapid, weak pulse, prostration, and some dyspnoea. The physical signs are those of a cavity and of bronchitis. Death usually ensues from exhaustion, sometimes from hæmorrhage.

Treatment.—The efforts of the physician are largely limited to measures for the relief of the primary disease and to the support of the patient's strength by nourishing diet and stimulants. Much attention must be paid to the removal of the horribly offensive odor arising from the discharge and of the breath of the patient. If cuspidors are used, they must contain active

disinfectants and are to be emptied as soon as used. Carbolic acid spray is to be freely used in the sick-room. The patient must inhale carbolic acid, thymol, myrtol, eucalyptol or terebene. If the cavity can be localized and is accessible, and other means have failed, surgical measures should be adopted.

It is very difficult to determine the actual value of internal medication. Theoretically, there is no reason why the indicated remedy should not favorably affect a case of pulmonary gangrene as promptly as it is known to affect a case of gangrene located elsewhere. As a matter of fact, however, reliable testimony to this effect is wanting. ARSENICUM, LACHESIS and CARBO VEGETABILIS should be carefully studied in addition to the remedies suggested by the symptoms of the primary disease.

CANCER (New Growths) OF THE LUNGS.

A disease chiefly of middle life. As a *primary* affection it is rare, is almost always unilateral, often occurring as a large growth occupying the greater part of one lung, and is usually epitheliomatous, scirrhus, encephaloid, more rarely sarcomatous or enchondromatous. *Secondary* cancer is more frequent, bilateral, sometimes solitary and chiefly confined to the pleura, occasionally disseminated, and in character encephaloid, scirrhus, epitheliomatous, colloid, melano-sarcomatous, enchondromatous or osteomatous. It occurs oftener in women than in men. Pleuritic involvement, with sero-fibrinous or hæmorrhagic effusion and involvement of the tracheal, bronchial and cervical glands, are common.

The *symptoms* frequently are vague, especially so when the disease is primary. There is pleuritic pain, dyspnœa from pressure chiefly upon the trachea, and dry, painful cough, with thin, dark-colored expectoration, somewhat resembling prune juice, and so designated. The development of the growth tends to encroachment upon other organs and to the appearance of important symptoms due to compression. Thus, compression of the trachea and bronchi gives rise to embarrassed breathing; of the veins, to marked lividity of the face and arms; the heart may be pushed toward the unaffected side, and distressing embarrassment of the respiration and of the heart's action be caused if the pneumo-gastric and recurrent laryngeal nerves

are caught in the meshes of the new growth. The physical signs are not characteristic, save those denoting consolidation of tissue. It is stated that the patient prefers to lie on the affected side. The course of the disease is from six to ten months, though death may occur earlier.

The diagnosis of primary cancer is difficult and sometimes impossible; it usually rests upon the unilateral character of the affection and the existence of such symptoms as cough with "prune juice" expectoration, involvement of cervical (possibly lingual) glands, progressive emaciation, etc. The secondary form is more easily recognized, and in the greater number of cases a diagnosis can be made from the history of the case, as the existence of malignant disease in some other part of the body (uterus, rectum, liver) or the appearance of pulmonary symptoms after an operation for the removal of cancerous growths elsewhere (mammary).

The treatment is practically restricted to efforts calculated to render the patient comfortable, to sustain his strength, and to meet emergencies as they arise. Of the remedies most likely to be suggested by the totality of the symptoms, the most promising are ARSENICUM, AURUM, CONIUM, CARBO VEGETABILIS.

DISEASES OF THE PLEURA.

Pleurisy or pleuritis, inflammation of the pleura, may be acute or chronic, circumscribed or diffused, primary or secondary, dry or accompanied with effusion. The qualifying terms "tuberculous," "cancerous," etc., refer to special ætiological factors.

ACUTE PLEURISY.

Acute pleurisy naturally divides itself into two distinctive forms: (a) *dry* (plastic, fibrinous pleurisy, i. e., *pleuritis sicca*); (b) pleurisy with effusion (*pleuritis humida*). Since material differences exist in the character of the effusion and in the clinical history of each, pleurisy with effusion is divided into: sero-fibrinous pleurisy; purulent pleurisy or empyæma; hæmorrhagic pleurisy.

Dry (plastic or fibrinous) *Pleurisy*.—It occurs rarely as a primary disease; in healthy persons from exposure or cold, occasionally from contusion of the chest. As a secondary affection it is seen in nearly all forms of pulmonary inflammation, except those which are deep-seated. Thus it is common in pneumonia, tuberculous disease of the lung, cancer, abscess, etc. The injected pleura is on the surface rendered dull and lustreless from a covering of lymph, which varies in thickness; if abundant, the friction of the opposing surfaces gives to it a flaky, shaggy appearance, or the fibrin arranges itself in distinct layers. Adhesions are frequent.

The symptoms are: sudden onset with moderate fever, pain in the side, aggravated by deep inspiration, and dry, rather painful, cough. The affection runs a brief course, the symptoms yielding shortly, and recovery taking place in a few days. Auscultation yields friction sounds and corresponding pleural fremitus upon palpation. The friction sounds may remain for some time after all other symptoms have yielded.

The diagnosis depends upon the stitching pain in the side, worse from deep inspiration, and the easily recognized friction sounds.

Treatment consists of rest in bed, the application of mustard plasters, hot poultices or turpentine stupes over the affected parts, and, if the pain is severe, of overlapping strips of adhesive plaster, such as are used in the treatment of fractures of the ribs. For “therapeutic hints” see below.

Pleurisy with Effusion.—The essential feature of this form is the presence in the exudate of a considerable amount of serum; the exudate may be purulent or, more rarely, hæmorrhagic.

Sero-Fibrinous Pleurisy.—**Ætiology**.—It occurs chiefly in the cold, changeable weather of winter and spring, and principally in adult life, oftener in men than in women. The primary form results from exposure, sudden wetting or chilling, or from an injury to the chest. Secondary pleurisy is more frequent; it is a feature of many acute or chronic pulmonary affections, among which tuberculous affections hold a prominent place. It is also seen in connection with inflammation of the pericardium and peritonæum, more rarely in acute infectious diseases, as influenza and typhoid fever, and in acute rheumatism, gout, etc.

Morbid Anatomy.—The effusion varies from a few ounces to eight pints, or even more; in an adult no disturbance results when it is less than ten ounces. It closely resembles blood-serum. Fibrin is found on the surface of the pleura, in flocculent masses or threads floating in the exudation, or in soft creamy deposits in the dependent parts of the fluid; fibrinous deposit may occur in the interlobar spaces and give rise to adhesion. The effusion naturally gravitates to dependent parts, unless it is retained by previously formed adhesions; in exceptional cases sacs are formed by the stretching of recent adhesions in which the fluid is retained (multilocular pleural effusions). It is clear or turbid, and in color varies from a light yellow (lemon-colored) to a darkish-brown. It also contains leucocytes, red blood corpuscles, swollen cells from the pleural epithelium, and often sufficient albumin to coagulate spontaneously upon standing; sugar, uric acid and cholesterine may be present in small amounts. Its specific gravity is 1015 to 1023. The presence of a large amount of fluid in the pleural cavities necessarily affects the lungs. The portion of the lung above the level of the effusion becomes atelectatic; if the effusion rises high, up to the clavicle, the lung is pressed close to the spine, and eventually becomes airless and even bloodless (carnified). Displacement of the adjacent organs follows a large effusion. If on the right side, there is depression of the liver, and in some cases change in the position of the heart; the latter more often assumes a transverse position, with some lifting of the apex; if on the left side, the stomach and transverse colon, and at times the spleen, are displaced downward. The presence of firm adhesions or of tumors and other growths in the thoracic or abdominal cavity modify the character and extent of an existing displacement.

Symptoms.—The disease may approach insidiously, with shivering and general indisposition for several days, or its onset may be sudden, with a hard chill, followed by fever and pain in the side, somewhat resembling pneumonia, but much less violent. The temperature ranges from 102° to 103°, very rarely beyond 104°; morning remissions are slight; this is likely to continue for a week or ten days, when the temperature drops to normal, without, however, material change for the better in the patient's general condition; in other cases a mod-

erately high temperature is maintained for several weeks. The temperature on the affected side may exceed that of the sound side by one or two degrees. The *pain* is sharp, lancinating, stitching ("stitch in the side"), and is usually limited to a small space in the axillary region or about the nipple; it is aggravated by coughing, breathing, sneezing, violent motion of any kind, and pressure. Sometimes it is diffuse, and may be felt below the clavicle or scapula, or it may be retrosternal, or be felt in the abdomen, or, if the diaphragm is involved, in the small of the back, resembling lumbago. Upon the appearance of the effusion the severity of the pain is much lessened. *Cough* in the greater number of cases is an early symptom, though it may be absent. It is short, dry, painful, disappears with the effusion, and is liable to occur when resorption of the effusion takes place. It is followed by slight, mucous, sometimes blood-streaked, expectoration. *Respiration* is frequent and shallow. *Dyspnœa* is often a prominent symptom, especially in case of primary pleurisy in strong, rugged persons, with rapidly progressing and copious effusion; if the effusion takes place slowly, especially in feeble persons, it may be very great and yet cause slight embarrassment of breathing, save upon exertion. The *pulse* is rapid, and in exceptionally severe cases irregular in force and rhythm. The position of the patient in bed at first is usually on the sound side; after effusion, lying upon the affected side is commonly preferred. The urine is dark, scanty and of high specific gravity; loss of strength and flesh and anæmia are present in tedious cases.

Physical Signs.—*Inspection* shows increase in the frequency of the respiratory movement, keeping step with the extent of the effusion, the respiratory movement almost ceasing in very bad cases; the respiratory embarrassment gives rise to dyspnœa. There is increase in the volume of the affected side as the fluid in the pleural sac accumulates, but careful measurement shows this increase is less than it appears to be. If the effusion is very large, the intercostal spaces widen and eventually are obliterated, but very rarely bulge. If the pleurisy is right-sided, the apex beat is lifted to the fourth interspace or pushed beyond the left nipple; if left-sided, the heart-impulse cannot always be detected; in cases of very extensive effusion it may be seen in the third or fourth spaces on the right side. After resorption

of the effusion, retraction and deformity of the chest are often observed, with displacement of adjacent organs toward the affected side, which in children and young subjects may be transient, but permanent in adults. "The chest assumes an exaggerated modification of the expiratory type. Its volume is diminished, its antero-posterior diameter greatly decreased; the lower intercostal spaces are narrowed until the ribs are in contact; the shoulder is lowered; the nipple sinks and approaches the median line, and the inner border of the scapula stands out from the surface of the chest" (Wilson). Lateral curvature of the spine, the concavity looking toward the affected side, is not uncommon, and a central cup-like depression in the region of the ensiform cartilage is occasionally seen. *Palpation.* Prior to effusion, there is pleural fremitus corresponding to the friction sound found upon auscultation. Fluctuation is rarely obtained. Tactile fremitus is much lessened or abolished, but returns upon resorption. An important sign is the absence of voice vibrations; the latter, however, may be distinct when communicated to the chest wall by extensive pleural adhesions. *Mensuration.* There is a difference of one to one and one-half inches between the sides, if the effusion is extensive. It must be remembered that in right-handed persons the right side is larger than the left. When retraction has taken place, the measurement changes correspondingly; the diameters are shortened, the circumference lessened, and the outlines of the affected side are those of exaggerated expiratory position. *Percussion.* No signs are obtained until the effusion reaches at least one pint. There is loss of resonance, first at the base posteriorly, gradually increasing with the increase of effusion until absolute dulness is reached; this dulness is described as possessing a peculiarly resistant, wooden quality, unlike that of pneumonia. If the effusion is moderate, "the phenomenon of movable dulness may be obtained by marking carefully, in the sitting posture, the upper limit in the mammary region, and then in the recumbent posture, noting the change in height of dulness." If the right side is affected, the dulness passes without change into that of the liver, and if the effusion is excessive, the dulness may not only involve the entire affected side, reaching up to the clavicle, but extend beyond the sternum to the other side. If the patient is erect, the upper line of dulness is higher behind

than in front. "Skoda's resonance," a very important sign, consists of a tympanitic sound in the subclavicular region, above the line of dulness, assuming a "flat" note in the lower mammary and axillary regions. *Auscultation.* Prior to the occurrence of effusion there is a distinct, creaking friction sound, much like the crepitus of pneumonia, which disappears as effusion takes place. It recurs after resorption, from renewed apposition of the pleural layers. There is feeble and distant breathing, later broncho-vesicular, and finally bronchial, often accompanied with loud, coarse râles, suggesting the existence of a cavity. Above the line of dulness the respiratory sounds are usually harsh. Vocal resonance is usually diminished or absent; sometimes there is bronchophony and occasionally ægophony. If the effusion is very large, the breath-sounds wholly disappear and vocal resonance is lost; Baccelli has pointed out the fact that the whispered voice is sometimes distinctly transmitted through a serous effusion, but not through pus.

Course and Termination. In the greater number of cases the temperature becomes normal in seven to ten days, the cough and pain having grown less troublesome with the appearance of the effusion. The natural tendency is to resorption of the effusion, which, if small, is accomplished in a few days, but, if large, may consume weeks and even months. In other cases, notably in tuberculous subjects, the effusion may not only persist for a long time without undergoing any change, but may reappear after aspiration. The effusion may assume a purulent character. Adhesions form during resorption; these are attended with pain upon breathing and exertion, but after a time cease to give inconvenience. Deformity of the chest frequently results. Recovery is the rule in uncomplicated cases, but death has occurred suddenly, following syncope from slight exertion, even when the effusion was moderate.

Treatment.—Rest in bed and nourishing, liquid diet must be ordered at once. If there is much pain, adhesive straps, carried well beyond the middle line, may be applied. After the appearance of exudation, slight counter-irritation may prove useful; for this purpose iodine is applied morning and evening over a small area, which is changed as soon as active irritation of the skin has been established; mustard-plasters answer the same

purpose. The use of liquids should now be restricted to about ten ounces daily, and, in the absence of indications to the contrary, a diet of meat, eggs and bread be instituted. To retard the effusion, it is advised also to give the patient a daily hot bath or vapor bath and to employ such means as will stimulate the activity of the skin and kidneys. Matthew Haye's plan is generally adopted; he gives to the patient every morning, or in less rugged persons every other morning, a dose of Epsom salts, an hour before breakfast, from one-half to one ounce, as concentrated as possible. Osler states that he has seen large effusions disappear rapidly under this treatment. Aspiration must be performed if the effusion is extensive, reaching up to the clavicle, or in the presence of pericarditis, valvular disease of the heart or pneumonia, or if the symptoms point toward the development of purulent pleurisy. Fever is not a counter-indication. The operation is made with an aspirating needle of medium size, introduced in the seventh interspace in mid-axilla or in the eighth interspace at the outer angle of the scapula. The arm of the patient must be brought forward, his hand resting on the opposite shoulder, and he must be supported by an assistant. The needle is thrust in quickly, giving it a slight upward direction, close to the upper margin of the rib. The fluid must be withdrawn slowly, and the operation stopped at once if there is faintness. A small glass of wine, or some other light stimulant, may be administered during the operation. A violent cough sometimes appears toward the close of the operation, but need excite no alarm. The needle is withdrawn quickly, and the puncture covered with adhesive plaster. The amount which may safely be withdrawn varies; if one entire side of the chest is filled, a quart is within the limits of safety. It is admitted that death occasionally occurs during the operation; the concensus of opinion, however, is that the risk of a fatal termination is much greater if no operative relief is given.

Purulent Pleurisy—Empyema.—This form is much more frequent during the first five years of life than at any subsequent period; the statement is made that in nearly one-third of all cases of pleuritic effusion in children it is distinctly purulent. Empyema may follow a sero-fibrinous pleurisy, the effusion gradually becoming more and more turbid, and finally chang-

ing into pus, probably because of pyogenic infection through the chest wall or within. The impression formerly held that aspirating causes a tendency to change the nature of the effusion from a sero-fibrinous to a purulent character is probably incorrect, except when surgical cleanliness was not observed. A remarkable tendency to purulency is seen in the cases of pleuritis which follow scarlet and typhoid fever; it is much less pronounced in other infectious diseases and in pneumonia and tuberculous pleuritis. Local injuries, as fracture of ribs, punctured wounds, perforation of the pleura from tuberculous cavities, or the presence of malignant disease in the œsophagus and lungs, are fruitful causes.

Morbid Anatomy.—The pleura is found thickened, often with erosions on the costal layer; fistulous openings and perforations are common. The effusion itself varies from a slightly turbid exudation containing traces of fibrin to a thick, creamy pus. It separates into two layers: an upper, comparatively clear, greenish-yellow serous layer, and a lower layer of thick, creamy pus. It is usually of a disagreeable sweet odor; offensive, when the empyema is due to traumatism; horribly offensive when there is gangrene of the lung or of its covering. The organisms most frequently encountered are the streptococcus, staphylococcus, pneumococcus, diplococcus and tubercle bacillus.

Symptoms.—The symptoms are those of a sero-fibrinous pleurisy, abrupt in onset when resulting from some injury, developing insidiously when occurring as a secondary disease. Pain, cough, and dyspnoea do not essentially differ from the sero-fibrinous form. The symptoms which indicate pus-formation are the appearance of fever or, if fever existed already, an increase of fever, assuming a remittent type. The general condition of the patient changes for the worse. There is complete loss of appetite, sleeplessness, restlessness, pallor, increasing weakness; children suffer especially from the latter symptoms.

The **physical signs** are those of pleuritis with effusion, with a much greater difference in the relative size of the sides and obliteration and even bulging of the intercostal spaces. Baccelli's sign (whispered pectoriloquy) is not heard here. There is œdema of the chest-walls, great prominence of the subcutaneous veins, and very pronounced displacement of the liver and

heart. The breath-sounds, in children, are distinct and tubular. In some instances the impulse of the heart-beat is so forcible that it gives rise to a distinct pulsation (*pulsating pleurisy*), which may be intrapleural or external, the latter in the external tumor of *empyema necessitatis*. It is perfectly proper to consider empyema in the light of a large internal abscess, the contents of which are more than usually "erosive" and "eat" their way out. Thus perforation is brought about, either of the lungs or of the wall of the chest. The former process usually takes place gradually, and is followed by recovery; in fact, discharge of the pus through the bronchial tubes is always desirable unless the bronchi are suddenly inundated, in which case the termination is almost always rapidly fatal. Perforation of the wall of the chest (*empyema necessitatis*) is most likely to occur at the thinnest place, near the sternum, from the third to the sixth interspace. A subcutaneous abscess is formed, with redness and œdema, discharging through one large or several smaller openings. Fistulous communications may open into the pleura at some considerable distance from the external orifice, with an oblique, irregular track, allowing only slow discharge of the contents; these may exist for years. Perforation may also take place into the pericardium, œsophagus, stomach or peritonæum; the pus has even been known to work its way downward along the spine, following the psoas muscle, into the iliac fossa, closely resembling a psoas or lumbar abscess. In other cases, when the purulent accumulation is not large, absorption may take place; the chest wall sinks in, the pleural layers become thickened, inspissated pus is retained, and lime salts may form. The sputum contains crystals of leucin and tyrosin.

The *course* of the disease is tedious and the **prognosis** bad, save in children, who more readily recover, even without surgical interference.

The **treatment**, aside from careful attention to diet and measures calculated to sustain the strength of the patient, is chiefly surgical. While the patient is doing well, especially in children, it is usually safe to trust to the recuperative power of nature and to remedies; but should the pulse become irregular and weak, respiration embarrassed, and the patient's general appearance unsatisfactory, the pus cavity should be promptly

emptied by the use of a large aspirator needle or, far better, by free incision, with the establishment of free drainage. In the latter case, after-treatment by distension of the lung on the affected side is an important consideration in securing the closing of the cavity. Osler highly recommends for this purpose Ralston James' method. "The patient daily for a certain length of time, increasing gradually with the increase of his strength, transfers by air pressure water from one bottle to another. The bottles should be large, holding at least one gallon each, and by the arrangement of tubes, as in the Woulff's bottle, an expiratory effort of the patient forces the water from one bottle to the other. In this way expansion of the compressed lung is systematically practised."

Hæmorrhagic pleurisy is characterized by an amount of blood in the effusion which is recognized by the naked eye. It must be distinguished from hæmothorax, which results from injury to any of the larger intra-thoracic blood vessels, rupture of an aneurism, or pressure of a tumor on the thoracic vein. Hæmorrhagic pleurisy occurs in connection with malignant infectious diseases, in cirrhosis of the liver and affections characterized by great depression of the vital energy (cancer, Bright's disease, etc.); the vascularity of tuberculous new formations may give rise to blood in the effusion; it is not unusual in primary and secondary cancer. It may be of traumatic origin, as from a wound in the lung accidentally inflicted by the needle of the aspirator. Blood is also seen in the exudate if paracentesis of the thorax is too prolonged. Occasionally it is found in perfectly healthy persons.

Other forms, as *tuberculous*, *diaphragmatic*, *encysted* and *interlobar* pleurisy, are recognized and have been incidentally mentioned. The *tuberculous* form is common in acute, subacute and chronic tuberculous processes, and presents the signs of pleurisy with sero-fibrinous effusion. *Diaphragmatic* pleurisy is limited chiefly or entirely to the surface of the diaphragm. It may be dry or moist, with sero-fibrinous or purulent exudation; commonly the exudate is plastic. The chief distinctive feature of this form is the locality of the pain, which is so low as to suggest acute abdominal disease, the fixation of the diaphragm, and the severity of the objective symptoms. *Encysted* pleurisy, formed by adhesions, is comparatively frequent in

empyema. Diagnosis is difficult. *Interlobar* pleurisy depends upon agglutination of the interlobar serous surfaces, with encysted fluid between them; if purulent, perforation of the bronchi may take place.

Diagnosis of Pleurisy.—Pleurisy is most likely to be mistaken for *pneumonia*, which it resembles in its dyspnoea, dulness on percussion and the usually unilateral character of the affection. The fever of pleurisy, however, is both irregular and moderate, while that of pneumonia is high and characteristic, with evening exacerbations, morning remissions and rapid defervescence when the force of the disease is broken. In pleurisy, there is characteristic sharp pain, friction sound, dry cough; in pneumonia pain is dull, there are crepitant râles, and expectoration. In pleurisy, usually, there is dulness, weak or absent respiration, voice and fremitus; in pneumonia, dulness, with bronchial respiration, increased vocal fremitus, thoracic voice. In pleurisy, effusion results in enlargement of the affected side, obliteration of the intercostal spaces, sometimes bulging (empyema), and displacement of adjacent organs; all these are absent in pneumonia, which, however, has the characteristic rusty-colored sputum.

The pain of pleurisy resembles that of *pleurodynia*, but the absence of friction sound and of fever, the shifting character of the pain, which often is bilateral, and the much greater external tenderness of the chest in pleurodynia makes the differentiation easy. *Intercostal neuralgia* lacks the friction sound and the fever, is intermittent, and presents tenderness to touch at the painful spots of Valleix, i. e., at the exit of the nerve from the spinal column, in the axillary region, and at a point near the sternum or in the epigastric region.

CHRONIC PLEURISY.

Chronic pleurisy may be dry or with effusion. Chronic pleurisy with effusion may develop insidiously or follow acute sero-fibrinous pleurisy; the effusion itself may be sero-fibrinous, sometimes existing for months without undergoing changes, or it may be purulent, i. e. a chronic empyema

Chronic dry pleurisy is clinically the much more important form. It occurs as a natural sequel of pleural effusion or as a

primitive affection. In the former, gradual absorption of the effusion takes place, the pleural layers are brought together and become agglutinated by the fibrinous material deposited upon their surfaces, resulting in the organization of a thick layer of firm connective tissue. Small cysts containing clear fluid or inspissated pus and calcifications frequently occur. These changes are oftener seen at the base, and cause flattening of the chest, insufficient expansion, and diminished respiratory murmurs. They are especially marked after empyema, and particularly in cases with perforation followed by gradual absorption or discharge of the pus, with pronounced retraction of the chest on the injured side and carnification of the lung. As has been pointed out, the permanent mischief arising from this condition is not as great as would appear at first glance; such pain as usually is felt at first gradually disappears, and permanent severe embarrassment of breathing is hardly ever experienced. Systematic expansion of the lungs, i. e., chest gymnastics, are of the greatest benefit in these cases. *Primitive dry pleurisy* may follow an ordinary acute plastic pleurisy or may develop insidiously, without any acute symptoms, the appearance of friction sounds being the first indication of trouble. In this form there is fibrinous adhesion, but there is neither involvement of the connective-tissue frame-work nor of the lung tissue proper, nor deformity of the chest. Adhesions are very common, especially in cases of pneumonia, and vary greatly in extent, involving now a small patch of the pleural surface, then being practically universal. No distinctly characteristic physical signs result; extensive and firm adhesions, however, interfere more or less with freedom of respiration; but even total adhesions may give rise to comparatively trifling annoyance. Another form of dry pleurisy is of *tuberculous* origin. It is of frequent occurrence, usually most pronounced at the apices, but may be universal, involving both pleuræ. The pleural layers are greatly thickened, and are the seat of tuberculous deposits in varying stages of development. Retraction of the chest-wall is common here. Some clinicians recognize a third form of dry pleurisy, followed by great thickening of the pleura, with ultimate invasion of the lung (cirrhosis). It is a disease of middle age, insidious in its onset, unilateral, and characterized chiefly by persistent pain at the base, gradually extending friction

sounds, dyspnœa upon exertion, impaired resonance at the base, feebleness of respiratory sounds, restriction of respiratory movements, and progressive retraction of the side. The disease is intensely chronic, and may exist for many years without appreciably affecting the general health. Bronchitis and bronchiectasis are common in the advanced stage of the affection. It is probable that this form is really of tuberculous character.

Therapeutics of Pleurisy.—**ACONITE** is useful in the first stage, before the inflammation has localized itself; the well-known characteristics are present.—**BRYONIA** is the most important and reliable remedy. It has sharp, stitching, "pleuritic" pain, aggravated from the slightest motion or pressure; dry, hard cough, with soreness in the chest wall and chest; relief of pain from lying on the affected side; copious sweating, thirst. Clinical experience proves its usefulness in all forms of acute and chronic pleurisy, whether dry or accompanied with effusion.—**APIS** is of value when there is extensive effusion; the patient suffers much from faintness, the result of the large accumulation of fluid in the chest.—**ARSENICUM**, like **APIS**, should be studied when there is effusion; it is of service in grave cases, with dread of suffocation, very scanty expectoration, great prostration, characteristic restlessness, and anguish. Tooker speaks of it as the prince of remedies in empyema.—**ASCLEPIAS TUBEROSA** has sharp pleuritic pain in the right side; dry, hacking cough, with tendency to hot sweating. It is of value in the tuberculous chronic form.—**BELLADONNA** is occasionally indicated in children, when the case is of the strongly pronounced congestive type; diaphragmatic pleurisy.—**CANTHARIDES** is strongly advocated by Jousset. In the exudative stage, with characteristic burning sensation. Slight fever; shooting pains in the chest; dry, hacking cough; faintness, dyspnœa.—**DIGITALIS** may be demanded when there is effusion with characteristic heart symptoms. Highly recommended by the older German clinicians, many of whom rank it with **BRYONIA**.—**HEPAR SULPHUR.** is undoubtedly a valuable remedy in the late stage of pleurisy and in chronic cases with purulency and such complications as arise in connection with the process of absorption. Hectic fever; chilliness; sensitiveness to damp air.—**KALI CARBONICUM.** Severe stitching pains, resembling **BRYONIA**, but refusing to yield to it. Important in old pleuritic adhesions of

tuberculous cases.—**MERCURIUS**. “Occasionally useful in chronic pleurisy, with sharp, sticking pains in chest; aggravation at night and from lying on the right side will characterize it” (T. F. Allen). Persistent chilliness, with periods of hot fever and fetid sweating.—**RANUNCULUS BULB**. Involvement of the diaphragm; myalgic pains in the chest; pain as from subcutaneous ulceration; acute stabbing pains, with effusion of serum; often relieves the pain of pleuritic adhesions.—**SENEGA** to a certain extent resembles **BRYONIA**, and has been successfully used when **BRYONIA**, in cases with effusion, is indicated and has ceased to act.—**SQUILLA MARIT**. is held in high esteem by Schwabe and other German practitioners, who believe that it is “extraordinarily useful” in bringing about rapid resorption of the exudation. Hale prefers it to **CANTHARIDES**, especially in the pleurisy of children. “I consider it useful when the pleuritic effusion is attended with capillary bronchitis caused by exposure to cold or dampness after eruptive fevers. The effusion is serous and forms rapidly, while the kidneys are very torpid and the heart rapidly failing in force.” **SULPHUR**, **IODINE**, **PHOSPHORUS**, **SILICA**, **CHINA** and **PSORINUM** should also be consulted.

HYDROTHORAX.

Hydrothorax is a dropsy of one or both pleural cavities without pleural inflammation. The effusion consists of a clear, limpid, watery fluid, without fibrin, and, although usually moderate in amount, it may reach several quarts. It is almost always secondary, occurring in connection with general dropsy, particularly dropsy resulting from renal or cardiac disease; it is due to the latter fact that the sudden occurrence of dyspnoea in renal and cardiac affections without general dropsy should at once direct attention to the pleura. In the majority of cases hydrothorax is bilateral; in disease of the heart it oftener involves one side only.

The **physical signs** are those of pleural effusion.

The **symptoms** consist of great embarrassment of respiration when the effusion takes place suddenly and is copious; otherwise its presence is hardly noticed. It is differentiated from the effusion of pleurisy by the absence of fever and pain, the presence of general dropsy, at least œdema of the feet, and the

existence of organic disease of the heart, kidneys, liver, or great vessels. Hydrothorax constitutes a dangerous complication of other affections and renders their prognosis very serious.

The treatment consists of the use of saline purges and, better, of the aspirator. If the effusion is extensive, too much reliance should not be placed on remedies. Those most worthy of confidence are: APIS, ARSENICUM, DIGITALIS, JABORANDI, ELATERIUM.

PNEUMOTHORAX.

Cases of pneumothorax, i. e., air in the lung, without the presence at the same time of either serous fluid (hydro-pneumothorax) or pus (pyo-pneumothorax) are rare.

Ætiology.—The affection is one of adult life, chiefly of men, but may occur in infancy. In the majority of cases it is the result of perforation due to disease of the pulmonary tissue, as in tuberculosis; it is stated that 90 per cent. of all cases occur in connection with tuberculous disease, from the rupture of the wall of a cavity or necrosis of the pleura during the process of caseation. A similar condition is seen in septic broncho-pneumonia and gangrene; or perforation of the lung may occur through the pleura in empyema; or, in a sound person rupture of air vesicles may take place from straining. Perforation of the parietal pleura, resulting in pneumothorax, occurs from perforating wounds of the chest (as occasionally from puncture with hypodermic needle) or from perforation through the diaphragm (malignant disease of the stomach or colon, rarely from abscess of the liver). Cancer of the œsophagus may give rise to perforation of the pleura and pneumothorax.

Symptoms.—The onset may be insidious and the symptoms so slight as not to be noticed during life. Usually, however, the onset is sudden, in the greater number of instances following a violent effort by which much stress is thrown upon the lungs, such as a severe fit of coughing or vomiting. There is felt a sensation as though something had torn or given away in the chest, with sharp pain in the upper part of the chest or in the back. If the injury is severe, and a large amount of air has suddenly entered the cavity, intense dyspnœa quickly follows (“air-hunger”), with symptoms of shock, such as pallor, lividity, coldness of the extremities and rapid, weak pulse.

More or less dyspnœa is present in all cases; but it varies greatly in degree; in cases of insidious growth and moderate extent it may amount to only inconsiderable shortness of breath, there being enough sound lung tissue to maintain respiration. The volume of voice is lessened in proportion to the shortness of breath, aphonia constituting a common symptom of pneumothorax. Wilson Fox points out that "air-hunger" is less pronounced in anæmics (pulmonary tuberculosis) because in such cases the blood less imperatively demands oxygen.

Physical Signs.—*Inspection*: Bulging of the affected side, with obliteration of the intercostal spaces and, usually, displacement of the apex beat of the heart. Displacement of the heart and liver.—*Palpation*. Vocal fremitus diminished or absent.—*Percussion*. The sounds obtained depend largely upon the extent of intrapleural tension. There is usually dulness over the fluid, and tympanitic or amphoric sound above. Change in the patient's position, by changing the level of the fluid in the chest, renders the dulness movable.—*Auscultation*. Absence of breath-sounds on the affected side, strongly contrasting with the exaggerated breath sounds on the normal side. Metallic, echoing sound of the voice, obtained by placing one ear on the back of the chest-wall while the assistant taps one coin on another on the front of the chest, is constant and characteristic. A swashing succussion sound (Hippocratic succussion) is produced by shaking the patient while the auscultator's ear is on his chest; this sound may be heard by the patient himself and by others in the room.

Diagnosis.—This usually is easy, especially in cases of sudden and violent onset; careful attention to the physical signs in doubtful cases will nearly always solve the difficulty. *Emphysema* has the same clear, tympanitic percussion sound, the same feeble breath-sounds, and the same difficulty of breathing, but in pneumothorax the tympanitic sounds and the feeble breath-sounds are more pronounced, there is greater displacement of the heart, the "splashing" sound is distinct when there is effusion, and in many of the cases the beginning of the dyspnœa may be traced back to a preceding paroxysm of severe pain in the chest. *Diaphragmatic hernia* is differentiated with much difficulty; the chief symptoms indicating it are "the history of the case as indicating previous abdominal rather than thoracic

disease, the absence of cough and expectoration, slight displacement of the heart, absence of intercostal bulging, and obliteration of the area of hepatic or splenic dulness, together with signs of the downward dislocation of the liver and spleen" (James C. Wilson).

The prognosis depends largely upon the nature of the primary affection. Occurring in a person of good health, it not only does not materially shorten life or injure general health, but recovery may take place; on the other hand, in advanced tuberculosis it forms a threatening complication. The condition often is chronic.

Treatment is that of pleurisy with effusion, including the use of a fine aspirator needle for the purpose of allowing some of the air to escape, and aspiration in cases of hydro-pneumothorax. If it causes no inconvenience, interference of any kind is inadvisable. Consult remedies applicable to pleuritis, pulmonary tuberculosis and affections of the lung and pleura generally.

DISEASES OF THE MEDIASTINUM.

Mediastinitis may be acute or chronic. The former may be idiopathic, but usually is due to traumatism, or accompanies infectious fevers and pyæmia, or follows inflammatory affections of the organs and structures with which it stands in close anatomical relation. It affects males oftener than females, and tends to suppuration.

The symptoms are pain and tenderness under the sternum, gradually increasing in severity, with cough, sometimes followed by blood-streaked expectoration; frequently there is considerable dyspnœa, general malaise, irregular fever, chills and sweats. If posteriorly situated, there may be marked dysphagia.

The *physical signs* are dulness on percussion under the sternum, redness of the skin and feebleness of the heart sounds, which appear distant. It is rarely possible to detect pulsation or fluctuation.

The prognosis must be guarded. The abscess may open externally or into the trachea, bronchi or pleural cavity, or may become inspissated and chronic.

Treatment is directed to the relief of pain and to the support of the strength of the patient. As soon as fluctuation can be detected, the abscess must be opened.

Acute lymphadenitis.—Swelling of the mediastinal lymph glands takes place in all forms of inflammation of the bronchi or lungs (influenza, measles, whooping-cough, broncho-pneumonia, etc.); it may also occur in certain infectious diseases (typhoid fever, diphtheria, facial erysipelas).

The symptoms caused are much like those of whooping-cough, save that there is not the sharp, shrill inspiratory effort of that disease; vomiting may follow the paroxysms of coughing; there may be dyspnoea, hoarseness and cyanosis, especially when making an effort. If the glandular enlargement is very great, the symptoms are those of mediastinal tumor. An abscess may form (suppurative lymphadenitis) in simple lymphadenitis; but, as a rule, this tendency belongs to tuberculous cases; it is always dangerous. As a usual thing, the glandular enlargement decreases as the primary bronchitis yields, and the symptoms lessen in severity; in other cases a chronic hypertrophy remains, with more or less dyspnoea. It is believed by some clinicians that long-continued pressure upon the pulmonary artery, from chronic enlargement of the mediastinal lymph glands, may induce tuberculous disease of the lungs.

The treatment consists of rest in bed, nourishing diet, and careful attention to the primary disease. The internal administration of MERCURY, IODINE and ARSENICUM IODATUM is likely to prove useful.

Morbid growths found in the mediastinum are cancerous in the greater number of cases, but almost any form of morbid growth may be met. They occur oftenest in men during the fourth decade of life.

The symptoms caused are chiefly those of intrathoracic pressure, with such special constitutional symptoms as belong to the character of the growth itself. Derangements of circulation are important. There is impediment to the return of blood through the vena cava superior and its branches, causing congestion, œdema and cyanosis; the veins themselves, rarely the

arteries, may become involved in the cancerous growth, and in many cases there is marked tendency to thrombosis and obliteration of the veins, resulting in general serous infiltration and tumefaction of the face, neck and upper extremities. On the other hand, hæmoptysis, hæmorrhagic effusion into the pleura, and infarcts may be similarly produced. Pressure upon the arteries diminishes the force of the blood current through them, giving rise to a difference in the radial and carotid arteries of the two sides, as there is also in aneurism of the aorta. The heart may be dragged from its natural position by the force of the attachments formed and the weight of the tumor, or the heart-substance may be invaded, and serous or hæmorrhagic effusion in the pericardium take place. Innervation of the heart is seriously affected and its muscular energy greatly impaired, disturbing the heart's action and giving rise to palpitation, faintness, nausea and vomiting and to abnormal sounds and rhythm. Pain is frequent and depends upon circulatory disturbances and severe dyspnœa, or is of a neuralgic character. Implication of the recurrent laryngeal nerve gives rise to paralysis of the vocal cords and aphonia or to violent paroxysms of dyspnœa. Distressing spells of cough and intense pain in the heart may be wholly of nervous origin. In rare cases paralysis of the limbs and trunk results from invasion of the spine. *Respiration* is usually normal when the patient is at rest, but severe dyspnœa is at once caused by so slight an exertion as change of position; this tendency is likely to increase with the growth of the tumor. Yet cases occur where only slight dyspnœa is felt in connection with an extensive new growth; in others, much suffering is caused even though the tumor be small. Bennett points out the striking want of correspondence between the physical signs and the functional symptoms. "In one case there will be persistent difficulty of breathing, amounting to orthopnœa of the most urgent character, in another merely a little quickened respiration—lividity and turgescence of features in one case, in another an anæmic aspect." *Fever* is rare.

Physical Signs.—*Inspection.* Cyanosis of the upper part of the body; establishment of collateral circulation (enlargement of the mammary and epigastric veins); orthopnœa. Bulging of the sternum from the outward pressure of the tumor, or ero-

sion of the sternum, part of the growth forming a subcutaneous tumor, sometimes pulsating like an aneurism; occasionally destruction of the soft tissues and perforation of the chest wall. Displacement of the heart often. *Palpation*: absence of fremitus if the tumor presses against the chest wall. *Auscultation*: vocal resonance usually absent. Respiratory murmur feeble or wholly wanting; heart-sounds absent.

The diagnosis is almost impossible in the early stage, and at all times rests upon the "want of correspondence with the ordinary forms of thoracic disease, the very general signs of the presence of pressure and mechanical derangement and the varying aspects of these signs." The resemblance to *aneurism* is striking; the most important points to be remembered, as especially characteristic of aneurism, are: the "diastolic shock" over the sac; forcible, heaving, expansile pulsations of the tumor, if external; radiating pains in the back, arms and neck. The possibility of a pleural effusion in these cases must be borne in mind.

The prognosis is serious, a fatal termination usually taking place in from three to eight months, though exceptionally life may be prolonged for several years. Malignant growths develop with great rapidity and have a comparatively short duration. Lymphadenoma and lymphosarcoma run a comparatively slow course, frequently attain an enormous size, and may involve all the structures within the thorax.

Treatment.—If the tumor is favorably situated, surgical treatment is practical and may prove equivalent to a cure. Other means are purely palliative, and the exhibition of opium in some form essentially becomes a necessity. Complications must be met according to circumstances and symptoms; remedies are exhibited according to the indications.

Abscess of the Mediastinum is usually the result of an injury, and occurs oftenest in the anterior mediastinum; if chronic, it is almost always of tuberculous origin.

Of the **symptoms**, throbbing pain behind the sternum is the most conspicuous; chills and sweats are commonly present, with more or less dyspnoea if the swelling is great. Burrowing of pus constitutes a dangerous possibility of acute abscess, though the pus may become inspissated, as is quite common in chronic abscess.

The diagnosis is indefinite, depending upon the presence of a pulsating, fluctuating tumor at the border of the sternum or at the sternal notch, with the absence of characteristic symptoms of aneurism.

Emphysema of the Mediastinum is a rare affection occurring in exceptional cases of diphtheria, whooping-cough, and from trauma. It may be associated with pneumothorax, and is seen with relative frequency in cases of tracheotomy. According to Champneys, the conditions responsible for its occurrence in cases of tracheotomy are: division of the deep fascia, obstruction of the air passages, and inspiratory efforts.

Affections of the Thymus Gland consist of abscess, hæmorrhage, and sarcoma and carcinoma. *Enlargement* of the gland is often found *post-mortem* in case of sudden death in children; spasms of the glottis (thymic asthma) are frequently associated with this condition. It is thought that death may be caused by pressure of the hypertrophied gland upon the trachea while the head is bent backward. Abscess of the thymus gland is an occasional feature of congenital syphilis, though it is seen, rarely, in non-syphilitic children. *Hæmorrhage* into the thymus gland has been found in purpura and scurvy and other hæmorrhagic diseases. *Sarcoma* and *carcinoma* of the thymus gland are secondary to malignant tumors of the anterior mediastinum.

PART VIII.

DISEASES OF THE ORGANS OF
CIRCULATION.

PART VIII.

Diseases of the Organs of Circulation.

DISEASES OF THE PERICARDIUM.

PERICARDITIS.

An inflammation of the pericardium which may be acute or chronic, and which is characterized by a fibrinous (plastic) or fluid (sero-fibrinous, hæmorrhagic or purulent) exudation, with a tendency to the formation of fibrinous adhesions (*adherent pericarditis*).

Ætiology.—Pericarditis occurs in any climate and at any period of life, somewhat oftener in males than in females. As a *primary* affection it is rare; it is oftenest seen in children or as the result of traumatism. *Secondary* pericarditis is of frequent occurrence in connection with acute articular rheumatism, from 30 to 70 per cent. of the latter affection, including tonsillitis and chorea of rheumatic subjects, presenting inflammation of the pericardium. In other cases the pericardium becomes involved through extension of disease from adjacent organs or structures; this takes place frequently in pleuro-pneumonia, especially of children and alcoholics, and, less often, in pleuritis, endocarditis, myocarditis, valvulitis and inflammatory affections of the œsophagus, mediastinal glands, adjacent bony structures or, rarely, of the abdominal organs. Septic processes (puerperal fever, acute necrosis of bone, etc.), tuberculosis, Bright's disease, influenza, gout, scurvy, diabetes, low states of the system and eruptive diseases of childhood are frequently associated with pericarditis; among these, Bright's disease and scarlatina are especially prominent.

Acute Plastic Pericarditis is almost always secondary. It is

the most frequent and benign form of pericarditis. It may involve a part of the pericardium or may be diffuse and general. The pericardium at first is injected and lustreless; it is soon covered with a thin layer of exudation which is easily separated. As the exudation increases, friction of the surfaces produces a roughened, ridge-like, shaggy appearance (*cor villosum*), and in bad cases the exudate, which may reach one-third to one-half inch in thickness, occurs in long, coarse shreds. Evidence of tuberculosis is frequently present, but is easily overlooked. There is invariably more or less effusion. The heart muscle is not affected, save in severe cases, when it looks pale and turbid.

The symptoms in the majority of cases are vague, so that the disease may not even be suggested during life. Pain may, or may not, be present. Sometimes there is tenderness to pressure over the præcordia or in the epigastric region, and occasionally this is sufficiently severe to resemble an angina, sharp, lancinating, and radiating into the left shoulder and arm. Fever, when present, is usually moderate, the temperature not exceeding 102° or 102.5° ; exceptionally, as in some cases of acute articular rheumatism, the fever is high, but this depends upon the severity of the primary disease.

Physical Signs.—The friction-sounds may be obtained from both palpation and percussion.—*Palpation.* Though by no means constant, rough friction fremitus is frequently felt, especially when the pericarditis is intense. It is most pronounced during the time of the heart's impulse, is rough and grating, and seems to be near the surface.—*Percussion.* Here the friction is quite constant. It is usually double (to and fro pericardial rub), but may be single or triple. It possesses a harsh grating quality, and sometimes "creaks," like new leather. The heart-sounds often can be heard above the friction sound, and may linger after it; they are obscured when the friction sound is very pronounced. The friction sound is close to the ear, near the surface, and is usually best heard over the right ventricle or at the base of the heart, rarely at the apex; it is intensified from pressure with the ear or stethoscope, from taking a full inspiration, and from assuming an erect posture; it is very variable in position and quality.

The diagnosis depends upon the presence of the friction-sound, its nearness to the ear, and its relation to the heart-

impulse. Pleural friction has similar qualities, but the sound is synchronous with the respiratory act and disappears when the breath is held. The murmur in aortic incompetency is differentiated by its constancy, the direction of its transmission (the systolic upward into the vessels of the neck, the diastolic down the sternum), and the history and other symptoms of chronic disease of the heart.

The prognosis in simple pericarditis is favorable, even in scarlatina and rheumatism; it is more serious in cases characterized by a low state of vitality, as in Bright's disease. Adhesions often take place, but are not necessarily serious. The affection may become chronic, especially in tuberculous cases, and then extensive thickening and short, firm adhesions may result, interfering with the free movements of the heart, a condition which results in compensatory hypertrophy of the heart, followed by dilatation and inadequacy. In other cases extensive effusion may take place.

Pericarditis with Effusion.—This form is common in rheumatic affections, in tuberculosis and septicæmia; it is to all intents and purposes the second stage of dry pericarditis and is treated as such by many writers. The effusion, which varies greatly in amount, and may occasionally be excessive, may be sero-fibrinous, purulent or hæmorrhagic. It is *sero-fibrinous* usually in idiopathic and rheumatic cases; the pericardium is covered with a thick, creamy layer of fibrin, which from friction is rolled up in ridges, or appears honey-combed, or in long villous extensions. There is more or less thickness of the pericardial layers, which may assume an almost "leathery" consistency. *Purulent* effusion is most frequent in cases dependent upon tuberculosis, influenza (Pepper), empyema and suppuration of glands and bony structures. In many cases the effusion is in reality sero-purulent, containing flocculi of fibrin; in others, especially tuberculous or cancerous cases, it is thick and creamy. *Hæmorrhagic* effusion occurs oftenest in tuberculous or cancerous pericarditis and in debilitated purpuric, scorbutic, depraved systems and in the aged. Both pericardial surfaces are injected and show hæmorrhagic spots. The effusion, in the dependent parts, contains thick, curdy masses of lymph. Resorption of the effusion may be complete, or there may be agglutination of the adjacent pericardial surfaces, resulting in ad-

hesions, either by loose long bands or uniform and firm. As in pleuritis, purulent effusion often leads to thick, cheesy deposits upon the serous membrane, with frequently calcareous deposits. The heart muscle is often involved in fatty and granular changes which usually do not reach a great depth, but may be extensive if the inflammatory action was intense. As stated, compensatory hypertrophy of the heart, eventually followed by dilatation, is the result of the extra strain put upon the heart by extensive adhesions. Purulent myocarditis may follow purulent pericarditis.

Symptoms.—The onset is usually insidious, sometimes in no sense characteristic, and the presence of the effusion may be the first expression of the pericarditis. Pain, sometimes very slight and dull, again sharp and lancinating, often provoked by pressure at the lower sternum, is more frequent in this form than in dry, plastic pericarditis; it may grow better or worse as the pericardial sac is distended by the fluid. *Fever* usually is moderate. The pulse at first is normally full, but later becomes weak and rapid, and in some cases is eventually lost during each inspiration (*pulsus paradoxus*). *Dyspnœa* is usually an early symptom, and grows worse as the effects of the pressure upon the heart grow more pronounced; it is accompanied with restlessness and inability to maintain the recumbent position; the patient looks anxious and distressed, and the countenance appears dusky. As the amount of fluid increases, the action of the heart becomes more seriously embarrassed and the dyspnœa, still increased by the pressure of the fluid upon the lung and diaphragm, amounts to a sense of impending suffocation. Pressure upon the trachea causes distension of the veins of the neck, and even fulness of the superficial veins of the thorax, dysphagia, and dry, hacking, irritative cough; aphonia is a not uncommon symptom, from pressure upon the left recurrent laryngeal nerve. Important nervous symptoms appear, the result of the primary rheumatism rather than of the pericardial involvement; in these cases hyperpyrexia is persistent and accompanied by delirium, sometimes resembling delirium tremens, or by melancholia with suicidal tendency; these mental disturbances are not permanent. In other cases the restlessness becomes excessive and assumes the form of insomnia, delirium and coma. Chorea and, rarely, epilepsy have been noticed, the lat-

ter during paracentesis. Dropsy develops with increasing cardiac failure, and death from heart failure may occur upon very slight exertion.

Physical Signs.—*Inspection*, if the effusion is large, may show an actual increase of the left side, determined by careful measurements; in children there is quite often decided bulging in the pericardial region and between the costal cartilages. The pressure from the fluid results in diminished respiratory expansion on the left side and, if strongly exerted downward, in a tumor-like fulness in the epigastric region; the heart is displaced upward and forward, and a diffuse pulsation may be detected in the third or fourth interspaces; often the cardiac impulse is invisible. Fluctuation, upon *palpation*, is rarely, if ever, detected.—*Percussion*. Increasing area of pericardial dullness, changing with the position of the patient, somewhat pear-shaped, with base down, most marked transversely toward the right nipple, extending beyond the reach of the cardiac impulse. Absence of resonance in the right fifth intercostal space (Rotch).—*Auscultation*. Disappearance of the friction sound, except at the base of the heart; it returns with the absorption of the fluid. Increasing weakness of the heart-sounds; they become more and more muffled and finally disappear, first in the region of the apex. Diminution of resonance in the left lung, and bronchial breathing, from pressure upon the left lung.

The *course* of the disease in many cases is rapid, and the termination favorable. The effusion may take place within forty-eight hours and, even though large, be absorbed quickly. Other cases occur where the patient lingers for weeks, both effusion and absorption proceeding slowly. Cases with sero-fibrinous effusion, and secondary upon rheumatism, usually recover; adhesions, however, invariably form, and in themselves constitute a serious sequel, if extensive. If the effusion is exceptionally great, the patient may die from asthma in the second or third week; there is also danger of death from syncope after an exertion. Septic cases are characterized by the rapid formation of pus and fatal issue within a few days. Cases with purulent effusion are always dangerous.

The *prognosis* is rendered grave by the existence of serious heart lesions, extensive pleuritis or pneumonia, and the stubborn hyperpyrexia in rheumatic cases; recovery is rare in the presence of tuberculous or malignant disease.

Diagnosis.—*Effusion in the pleura* is often mistaken for effusion in the pericardium. “But a pericarditis uncomplicated with pleurisy or with pleuro-pneumonia does not change the clear sounds at the back of the chest, save in very rare cases of enormous accumulation of fluid. Effusion into the pleura gives rise to a flat sound anteriorly; to a still more perceptible dulness at the inferior portion of the chest posteriorly; and the sounds of the heart remain unaltered, unless its investing membrane contain fluid also” (Da Costa).—*Dilatation* of the heart in many respects closely resembles pericardial effusion. Osler points out the following: in dilatation, the impulse, especially in thin-chested people, is usually visible and wavy; the shock of the cardiac sounds is more distinctly palpable in dilatation; the area of dulness in dilatation rarely has a triangular form, nor does it, except in cases of mitral stenosis, reach so high along the left sternal margin nor so low in the fifth and sixth interspaces *without visible or palpable impulse*. An upper limit of dulness shifting with the position speaks strongly for effusion. In dilatation the heart-sounds are clearer, often sharper, valvular, or foetal in character; whereas in effusion the heart-sounds are distant and muffled. Rarely in dilatation is the distension sufficient to compress the lung and produce the tympanitic note in the axillary region.

Treatment.—It is evident that complete rest, mental as well as physical, is absolutely necessary. Whatever excites the action of the heart is to be carefully avoided, and special pains must be taken to guard the patient when there is extensive effusion, since even a slight exertion may bring on syncope with fatal results. In plastic pericarditis blistering over the heart has still earnest advocates, but it is not as generally recommended as ice bags at the præcordia. It is claimed that by this treatment, maintained at first for one or two hours at a time, then continuously, the action of the heart is retarded and the danger of effusion much lessened. In full-blooded persons bleeding by leeches may be advisable. After effusion has taken place, measures to promote its resorption are indicated. Clinical evidence shows that here blistering is of positive service. A purge of Epsom or Rochelle salts, every other morning, may be ordered if the patient is sufficiently robust. Pepper recommends the iodide of potash, ten grains three times each day, particularly

when the case has become chronic. Hyperpyrexia, if persistent, demands the cold pack or ice. Surgical measures are indicated as soon as the heart shows inability to carry on its function and there is great dyspnoea, small pulse, venous congestion, etc. The aspirator may be used if the history of the case warrants the presumption that the effusion is sero-fibrinous or when exploratory puncture demonstrates that such is the case. The puncture should be made in the fourth or fifth interspace, in the former at, or within an inch of, the left sternal margin; in the latter from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches from the sternum. Occasional injury by puncture of the heart itself has proved free from serious results. Free incision into the pericardium is practiced when the effusion is purulent. The more radical operation so far has been disappointing in its results, a fact attributed by its advocates to unwarrantable delay in performing incision and to the difficulty of maintaining good drainage. The diet throughout must be dry, light, and nutritious.

Therapeutics.—In the first stage ACONITE is exceedingly useful, especially in rheumatic cases. Its characteristic indications must be present.—BELLADONNA, like ACONITE, is most useful before the inflammatory action has become fully localized. It must be consulted in cases of children having scarlet fever and in rheumatism, with much redness, tenderness and swelling of the joints, and when the symptoms of congestion are well marked. It is of great service in cases with pronounced cerebral disturbances, either violent delirium bordering upon mania or, later, with tendency to stupor, pallor of the face and threatening dissolution.—BRYONIA is almost as useful here as in pleurisy. The pains are sharp, lancinating, "pleuritic;" there is oppression over the region of the heart; characteristic rheumatic and gastric symptoms (dryness of the mouth; tongue coated white or brownish; epigastric soreness, often with sensation of hard lump in the stomach); scanty urine of acid reaction; sweating.—VERATRUM VIRIDE is very valuable when, early, there is violent and tumultuous action of the heart, so it fairly lifts the chest. This condition is oftener seen in full-blooded, powerful men, and is associated here with great congestion and high tension, well manifested in the full, hard, bounding pulse of such cases. It should not be continued too long or given in too large doses.—SPIGELIA is an excellent remedy when there is sharp, stitching

pain in the heart, worse from every movement; palpitation; dyspnœa, especially when lying on the back; dry cough; rheumatic history; pleuritic involvement.—*CIMICIFUGA* is useful in rheumatic cases, sudden and severe in onset. "The fever is not high, but the pain is intense. There is excessive impulse of the heart over a large space, with increase of dulness on percussion. The pain in the heart is diffused all over the left side and extends down the left arm. The headache is peculiar, a sensation of bursting as if the top would fly off, with violent aching in the eye balls. The heart's action is violent and irregular (choreic). Great depression of spirits, gloomy and taciturn. The pains are described as aching, stitching, benumbing or coming on in sudden shocks" (E. M. Hale).—*KALMIA* is suggested by its close relation to rheumatic affections, shifting in character, going to the heart and involving the arms and shoulders, with stiffness and numbness, paralytic weakness and trembling. There are paroxysms of intense anguish about the heart, the beating of which is rapid, tumultuous, visible. It resembles *ACONITE* and *CIMICIFUGA*. *ASCLEPIAS TUBEROSA*, *RANUNCULUS* and *SQUILLA* should be consulted.

Effusion having taken place, and the remedies already enumerated proving insufficient, *APIS*, *COLCHICUM*, *KALI HYDRIODICUM*, *CACTUS* and possibly *SULPHUR* should be carefully studied, particularly with reference to their general, constitutional indications. Thus, *APIS* is likely to prove useful when there is a tendency to general dropsy, with great scantiness and almost suppression of the urine; great "soreness" over the heart.—*COLCHICUM* has very positive rheumatic symptoms, with tearing, jerking pains and tendency to involve the heart. There is little fever, hot and moist skin, and weak, intermitting, quick pulse. The pain about the heart is severe, with much dyspnœa, and in character resembles the squeezing, constrictive, band-like pain of *CACTUS*. Occasionally the characteristic gastric symptoms are present (craving for various things; if they are brought to him, especially when he smells them, they "turn his stomach" and he cannot eat them).—*KALI IODATUM*, in comparatively light doses, five to ten grains three times daily, is highly recommended by the physiological school, and many cures with it of effusion within the thorax have been reported by homœopaths. It is known to be an excellent remedy in suba-

cute articular rheumatism. It has constant dyspnœa, and cough with expectoration like soap-suds. Hale claims to have had good results from it in alternation with DIGITALIS and, especially, CONVALLARIA, the latter assisting its action as a heart-tonic. "SULPHUR follows KALI IODATUM, and rivals it in pericardial exudations."—CACTUS is indicated chiefly by its sense of band-like constriction about the heart, giving rise to great dyspnœa, sense of suffocation, inability to lie down, and cold sweat.—SULPHUR has cured "cardiac dropsy," and may prove useful here in chronic cases presenting the characteristic constitutional peculiarities of the remedy.

It is evident that the entire list of so-called heart-tonics must be consulted when this organ gives proof of exhaustion, as occurs often in severe cases. (See Chapter on Valvular Disease.) It must, however, be remembered that frequently prompt relief of distressing and threatening conditions can only be brought about by the operative measures already indicated.

CHRONIC ADHESIVE PERICARDITIS.

Chronic adhesive pericarditis or adherent pericardium consists of more or less extensive agglutination and adhesion between the pericardial layers, resulting from connective-tissue formation which follows acute inflammation of the membrane. The lighter forms of adherent pericardium follow the simple plastic cases of pericarditis, chiefly of rheumatic origin. In some of these the adhesions consist of only a few bands, which do not to any extent interfere with the freedom of the heart's action. In others the adhesion is firmer and more extensive, and the thickening much greater. Chronic tuberculous cases are usually characterized by extensive adhesions and great thickening, with serious interference with the action of the heart, causing compensatory hypertrophy of that organ, followed by degeneration and dilatation. In pericarditis with copious effusion of sero-purulent or purulent character, inspissation of the remnant of the effusion and calcification, most marked about the base of the heart, are frequently observed, and in exceptional cases the entire heart may be held in a calcareous investing membrane.

The symptoms are indefinite, and the condition may entirely

escape observation during life unless there is a considerable degree of heart failure, in which case irregularity of the pulse, cyanosis and other characteristic symptoms are present. In some cases there is weakness of the pulse, worse during inspiration (*pulsus paradoxus*).

The physical signs are somewhat more distinctive, but not clear-cut. Of special value is the systolic retraction of the chest, usually plainest at the apex; it is strongly emphasized when there are also extra-pericardial adhesions with the heart and with the chest wall; the more extensive the systolic retraction, the more valuable the sign, which is most pronounced during inspiration. Friedreich's sign, "diastolic collapse," consists of a sudden collapse of the jugular veins at each diastole, to be filled again during the next systole; it is comparatively rare and uncertain. The area of cardiac dulness is increased, especially upward, even as high as the second or, rarely, first interspace, but it is not affected by a change in the patient's position, nor is it pear-shaped.

The duration of the disease is uncertain. As stated, light cases rarely attract attention; in severe cases it is the eventual occurrence of dilatation of the heart which demands relief.

The treatment will be considered later.

HYDROPERICARDIUM.

"Dropsy of the heart" is usually seen in connection with the general dropsy of renal (Bright's) and cardiac (valvular) disease. Rarely it follows scarlet fever or profoundly anæmic or cachectic states. The fluid is of light-yellow color, sometimes turbid, and frequently tinged with blood or biliary matter; occasionally it is chylous.

The symptoms and physical signs are those of effusion and pressure. If the effusion takes place gradually, there may be no appreciable disturbance. Friction-sound is never present.

The diagnosis rests upon the history of the case, the existence, usually, of general dropsy, and the absence of friction sound.

The prognosis is necessarily grave.

Treatment must be directed to the cause and, in addition to such remedies as are indicated symptomatically, may call for surgical measures (aspiration).

HÆMOPERICARDIUM.

Hæmorrhage into the heart's sac occurs from rupture of the first part of the aorta, of the coronary arteries, of the heart wall (in myocarditis), or as the result of injuries to the walls of blood vessels, as from penetrating wounds.

The symptoms are those of hæmorrhage and heart failure. They are especially severe and rapidly fatal in the bursting of an aneurism. In spontaneous rupture of the heart there are signs of effusion, with heart failure; life may be maintained for several days. The physical signs are those of a moderate effusion.

The prognosis is necessarily hopeless, save in cases where the hæmorrhage is insignificant and may be absorbed.

Treatment consists of absolute rest, the exhibition of cardiac stimulants and, possibly, paracentesis.

PNEUMOPERICARDIUM.

The presence of air in the pericardial sac is a rare event, and almost invariably results from a penetrating wound of the chest or from perforation of the lung, stomach, or œsophagus (ulcers or cancer). Pericarditis is always present, followed by rapid effusion, more frequently purulent. "When the effusion is copious, the fluid and gas together give a movable area of percussion dulness with marked tympany in the region of the gas. On auscultation, remarkable splashing, churning, metallic phenomena are heard with friction and possibly feeble, distant heart sounds" (Osler). The termination is rapidly fatal.

DISEASES OF THE ENDOCARDIUM.**ENDOCARDITIS.**

Inflammation of the endocardium is usually limited to the valves. It is rarely a primary disease, but occurs in the course of, and as a complication in, infectious diseases. Clinically, two forms are recognized: acute or simple and chronic or malignant endocarditis.

ACUTE OR SIMPLE ENDOCARDITIS.

Ætiology.—Simple endocarditis is wholly a secondary affection; even in cases which appear primary it is safe to assume that it is based upon a latent rheumatic tendency. It is most frequently associated with acute articular rheumatism (60 to 80 per cent.), and Pepper states that “rheumatic endocarditis seems rather a special localization of the rheumatic disease than a secondary affection to which a prolonged and debilitating disease has rendered the system liable.” It is also of frequent occurrence in tonsillitis, an affection closely allied to rheumatism. It may be a complication, usually late, of scarlatina, much more rarely in measles, chicken-pox, typhoid fever, pneumonia, phthisis, and in affections characterized by progressive emaciation and exhaustion, as cancer, diabetes, Bright’s disease; it is also seen in gout, gonorrhœa, pyæmia and septic conditions. In chorea the endocardium is quite often involved, Osler having found simple warty vegetations on the valves in sixty-two of seventy-three cases of fatal termination collected by him. The same marked tendency to endocardial involvement exists in chronic valvular disease. Generally speaking, simple endocarditis occurs oftener in childhood than in adult life, and among adults oftener in men than in women. Pregnancy and the puerperal state are said to be predisposing causes.

Morbid Anatomy.—The affected endothelium is covered with minute “warty” or verrucose growths, rarely exceeding 4 mm., often attached by a delicate pellicle. There is small-celled infiltration of the subendothelial connective tissue and superficial coagulative necrosis, with thin layer of fibrinous exudation. “A vegetation is a small area of granulation tissue capped with fibrin.” The left side of the heart is much more commonly affected; in fœtal life the reverse is the case. There is a marked preference for the mitral valve over the aortic. In either case the vegetations occur in a row of small bead-like elevations at 2 to 3 mm. from the free margin of the valve, i. e., at the point of maximum contact on closure.

Resolution may take place by absorption, but it is rarely complete; or there may be increased proliferation of the connective tissue elements of the valve, often involving the chordæ

tendineæ and giving rise to danger of adhesion of leaflets or of the valve to the wall of the heart or the aorta. It is also possible that a vegetation may be detached and carried into the circulation, constituting an embolus, leading to infarction, usually of the kidneys, spleen, brain or lungs, or exceptionally to the formation of abscesses in these organs if micro-organisms were present.

Symptoms.—Scarcely a disease known is so easily overlooked, for there is a remarkable absence of characteristic symptoms or physical signs. Cases will go on to a fatal termination without a suspicion of the fact that endocarditis is responsible for the mischief, until revealed by examination after death. In some cases of acute articular rheumatism endocarditis may be suspected when there is an increase of the rapidity of the heart's action, with some irregularity, increase of fever, some dyspnœa and, exceptionally, pain at the heart, without increase of the articular disease; but more frequently nothing occurs to arouse suspicion. Physical signs are equally indistinct until marked hypertrophy and dilatation have taken place, when both symptoms and signs are characteristic of that condition.

Complications and Sequels.—Of the complications likely to arise, myocarditis is the most common. Pericarditis may exist or take place from extension. Pleurisy or pneumonia may result from impeded pulmonary circulation. Rupture of the chordæ tendineæ of a papillary muscle is not infrequent. The possible occurrence of embolism has been mentioned; it oftenest involves the kidneys, next in the order of frequency the spleen, very rarely the brain and skin; if the right heart is the seat of the endocarditis, the lungs are involved first. Embolism, however, is a much more common sequel in the malignant form of endocarditis.

The diagnosis is necessarily uncertain.

The prognosis in uncomplicated cases, especially in children, is favorable; complications add much to the seriousness of the case; the recurring form, which is common in rheumatic cases, has a strong tendency to result in valvular disease of the heart, a fact which must always be borne in mind.

Treatment.—The knowledge that endocarditis is liable to set in during the course of certain affections, notably acute articu-

lar rheumatism, suggests efforts to forestall such an occurrence. No preventive measure is so important as the enforcement of absolute bodily and mental rest and avoidance of any influence which may excite the action of the heart. It is equally necessary to maintain an even temperature (72° to 75° F.) and to guard the patient against draughts.

MALIGNANT ENDOCARDITIS.

The term "malignant" endocarditis embraces the so-called "infectious," "ulcerative," "diphtheritic" and "mycotic" forms of endocarditis.

Ætiology.—Exceptionally malignant endocarditis is primary. Of the diseases with which it is associated as a secondary affection, pneumonia heads the list. Rheumatism is much less often complicated with the malignant than with the simple form of endocarditis, statistics showing that the former is found in only 8 or 9 per cent. of cases. It is seen in erysipelas, septicæmia, puerperal fever and gonorrhœa, and in septic processes generally. Puerperal endocarditis is more frequent after abortion than after labor at full term, and (as in rheumatism) is more likely to occur during the first week of the fever. It is rare in chorea, typhoid fever, tuberculosis, diphtheria, and occurs only exceptionally in small-pox and scarlet fever. While no age seems exempt, by far the greater number of cases occur during the fourth decade of life. The existence of old valvular lesions is a strongly predisposing factor. Alcoholism, exposure, unhealthful living and bad habits are predisposing causes, largely because they vitiate the system and lessen its powers of resistance to disease.

Morbid Anatomy.—The essential lesions are vegetative, ulcerative, or suppurative; one or the other may be well pronounced, and all may be present in the same case; all are characterized by necrosis and loss of tissue. The vegetations resemble those of the simple form, but are larger and more luxuriant; in case of ulceration they usually present a greenish color and may be encrusted with lime salts; small abscesses often occur at their base. Ulceration may be superficial, confined to the endocardium, or deep; if the latter, it leads to perforation of the valve segment, or septum, or of the heart itself, and by exten-

sion may give rise to valvular and even partial cardiac aneurism or, rarely, to purulent myocarditis or pericarditis. Suppuration first affects the deeper tissues of the valve and is frequent at the base of the vegetation. The mitral and aortic valves are by far the favorite seat of the disease; the heart-wall, in a series of 209 cases collected by Osler, was affected in 33 cases. Of these, involvement of the upper part of the septum of the left ventricle and of the posterior wall of the left auricle were the more frequent. Ulcerative processes, as indicated, may lead to erosion and perforation, with more or less complete destruction of the valve, chordæ tendineæ, septum, heart wall, and the formation, less frequently, of aneurism. The distant changes are characteristic of the primary disease, of distinctly septic processes, and of embolism. The infarcts are red or white, suppurative, and vary exceedingly in numbers. They are found in the spleen, kidneys, brain and lungs, the latter if the tricuspid or pulmonary valve is involved. In pyæmic cases multiple miliary abscesses are frequent. Minute hæmorrhages into the skin, serous surfaces and retina often result from the embolism. Acute suppurative meningitis occurs in about ten per cent. of all the cases studied; acute suppurative parotitis has also been observed.

Symptoms.—The clinical history is exceedingly varied and striking in the absence of clear-cut, characteristic symptoms; the absence of characteristic signs (physical) adds to the difficulty of a satisfactory description of the disease and to the uncertainty of the diagnosis. It is possible that the presence of symptoms which suggest pyæmia—as irregular fever, copious and excessive sweating, delirium, gradual failure of strength—is most conspicuous, and whenever these assert themselves in the course of an acute disease with which endocarditis may be associated, suspicion of cardiac trouble is warranted.

The onset of endocarditis is frequently marked by a chill, followed by irregular fever, remittent or intermittent, with an evening temperature rarely exceeding 104° F.; sometimes, however, the fever is continuous and the temperature persistently high. Repeated rigors, drenching sweats, and great exhaustion follow; the sweating in severity often exceeds that of phthisis and ague. The spleen frequently is enlarged and tender, the urine albuminous, and gastro-intestinal irritation, espe-

cially nausea and vomiting, may be pronounced. Slight complaint, and frequently none whatever, is made of the heart; there is rarely pain, but the patient may have some palpitation, slight dyspnœa, and a sense of oppression or constriction. Headache, restlessness, and slight mutterings, with a tendency to stupor, are common; in severe cases the nervous symptoms are sufficiently marked to constitute a distinct type of the disease. Jaundice is not uncommon; erythematous and petechial rashes are often seen, and may add to the uncertainty which surrounds the case.

The clinician easily recognizes distinct types of malignant endocarditis. Of these the *typhoid* form is the most common. Here the early prostration, the pronounced character of the nervous symptoms (delirium, somnolence, coma), the diarrhœa, sweating and copious petechial eruption, with, often, an absence of distinct heart symptoms, is calculated to mislead the most experienced practitioner. The *septic* (or *pyæmic*) form occurs oftenest in connection with puerperal processes, necrosis of bone or external suppuration. It has the characteristics of pyæmia; here, also, the heart-symptoms may be completely masked, and the true nature of the difficulty may easily be overlooked unless the occurrence of embolism solves the difficulty. These cases may closely resemble severe malarial fever. Again, the *cerebral* symptoms may be so pronounced as to suggest a meningitis. In chronic valvular disease, also, there appear at times, without cause and with great suddenness, high fever and symptoms of endocarditis which may assume a septic or typhoid form and frequently run a rapidly fatal course.

Embolism gives rise to symptoms which usually are recognized without much difficulty. If the infarction occurs in the spleen, there is likely to be swelling of that organ, with pain and localized peritonitis; if in the kidneys, and of sufficient size to cause trouble, there is lumbar pain and highly albuminous and bloody urine; if in the brain, the symptoms vary with the seat of the obstruction and the lesions resulting from it, but delirium, coma and paralysis are quite sure to supervene. In addition, dimness of vision, retinal hæmorrhage, jaundice, erythema or petechiæ, suppuration, and even gangrene, may develop.

The *course* of malignant endocarditis depends largely upon

the primary disease with which it is associated; it rarely exceeds five or six weeks, save in the form which occurs in connection with chronic valvular disease; here it may continue for months.

The prognosis in the genuine malignant form is unfavorable; cases are occasionally reported cured, but it is probable that these were of the simple form.

Diagnosis.—The difficulty of the diagnosis has been discussed.

From *simple* endocarditis the malignant form is differentiated by the greater severity of the constitutional symptoms, the occurrence of rigors, height of fever, the copious sweating, the marked involvement of the nervous system, and the septic or typhoid coloring of the case. From *typhoid fever* it is distinguished by the usually more abrupt onset, the irregularity of the fever, the greater frequency of albuminuria with casts, and, if these are present, the oppression about the heart, palpitation, and cardiac pain. Compared with *rheumatic fever*, it has splenic enlargement, petechiæ, albuminous urine with casts. Differentiation from *pyæmia* is unnecessary, since malignant endocarditis is practically a pyæmic process. In all cases the appearance of symptoms denoting embolism clears up the diagnosis.

Treatment.—The treatment is largely that of pyæmia. Diet must be nourishing and easily assimilated, and rectal alimentation may become necessary through irritability of the stomach and vomiting. If in the early stage the action of the heart is excited, the external use of cold (bladder filled with cracked ice) over the heart is indicated; later, cardiac tonics are called for. Alcoholic stimulants may be demanded.

Therapeutics of Endocarditis.—**ACONITE.** Its usefulness in the early stage is admitted by all schools; its characteristic indications need not be repeated. Hale also suggests it when there is failure of the heart muscle, with small, thready pulse and fluttering heart; cold, clammy skin; patient anxious; intelligence clear.—**BELLADONNA.** General and great congestion. Throbbing and violent palpitation of the heart.—**BRYONIA.** Rheumatic history and tendency. Stitching pain at the heart. Weak, irregular pulse, with violent palpitation from making an exertion.—**CACTUS.** Violent palpitation, with determination of blood to the head; intense headache; nose-bleed; pricking at

the heart; sensation as though the heart were compressed in a vise or band of iron; cold sweat, etc.—*CIMICIFUGA*. Rheumatic cases. Pains extending over the chest and down the left arm, with numbness in the arm. Heart's action irregular, tumultuous, "cranky," jerking, choreic. Dyspnœa; lividity of face; coldness and cold sweating of the hands. Intense frontal headache, with severe soreness and deep aching of the eyes, with great mental depression.—*SPIGELIA*. More frequently indicated in pericarditis, it is of service in endocardial inflammation when there is violent and irregular action of the heart, with severe neuralgic pains of a stitching character, dry cough and dyspnœa at every change in position.—*VERATRUM VIRIDE*. Resembles *ACONITE*, but has a heavier, firmer, farther-reaching pulse. The heart-beat is powerful and the arterial tension high. There may be delirium of a wild character; sometimes muttering. As with *ACONITE*, Hale thinks *VERATRUM* useful also when the entire picture has changed and heart failure is indicated. "The pulse sinks to 25 or 30 per minute, but remains full and large, but very soft; so soft, indeed, as to afford no resistance to the finger; the beats of the heart are the same, or in some instances double, two pulsations being required for the half-paralyzed ventricle to send the sluggish current to the wrist."

Endocarditis of a malignant character additionally suggests such deeply acting remedies as *ARSENIC*, *CROTALUS*, *LACHESIS* and *PHOSPHORUS*.—*ARSENIC* is indicated by its great depression, anguish, restlessness, thirst, profound cachexia, feeble and irregular pulse, excessive dyspnœa and general tendency to malignancy.—*CROTALUS* and *LACHESIS* cover extreme prostration, with characteristic septic conditions, and are particularly applicable to cases in which ulcerative processes involve the tissues, with septic, pyæmic and hæmorrhagic conditions developing.—*PHOSPHORUS* deserves careful study in connection with inflammatory action tending to extensive degeneration and a vitiated state. I am not aware of conclusive clinical proof of its efficiency in malignant endocarditis, but to those familiar with the pathogenesis of the drug its applicability, theoretically at least, must be evident.

In case of heart failure *DIGITALIS* and other cardiac stimulants will be demanded; for hints concerning these, consult the treatment of valvular disease; consult also the therapeutic hints given under pericarditis.

CHRONIC ENDOCARDITIS (Chronic Valvular Disease).

Chronic, sclerotic or interstitial endocarditis is sometimes a primary disease, but usually it is secondary to acute endocarditis, especially of the simple form, or to rheumatism, chorea, or certain infectious diseases. The close relation of endocarditis to rheumatism has already been pointed out, and careful observers are strongly inclined to believe that even in cases the history of which shows no attack of rheumatism, the rheumatic tendency or element is none the less active as an ætiological factor. Other important causes are: violent and prolonged muscular exertion; alcoholism; gout; syphilis.—Age. The frequency with which rheumatic fever attacks the young explains the common occurrence of chronic endocarditis in early adult life; the mitral valve is here oftenest affected. During foetal life the right heart is almost always the seat of the lesion; in old age aortic disease is more common, as it also is in cases which result from excessive muscular exertion.—The influence of sex is less positive. Women more frequently suffer from rheumatism and chorea, and men oftener from syphilis and gout; in the main, valvular disease is somewhat more common in women than in men. F. J. Smith states that mitral stenosis is much oftener found in women, and aortic disease about three times as often in men as in women. Chronic endocarditis invariably leads to deformity of the affected valve; it practically constitutes chronic valvular disease, and will be treated as such here.

Morbid Anatomy.—The structural changes begin with a slight thickening at the edge of the valve, along the line of contact, with, at times, some slight nodules, the remnants of the wart-like vegetations seen in the acute form of the disease; the endocardium appears dull, lustreless, opaque, and slowly grows in thickness and inelasticity; this process eventually extends throughout the entire valve. The “thickening” is the result of connective tissue formation, depending upon proliferation of the endothelium and round-cell infiltration of subendothelial connective tissue. Sclerotic changes take place early; minute areas of fatty degeneration appear here and there; later, there is contraction of the fibrous tissue, giving rise to

such a degree of deformity of the valve, i. e., thickening of the substance of the segment, with curling at the edges, that it no longer "fits" and cannot properly close. In many cases this "thickening" involves the chordæ tendineæ, which are shortened in proportion; agglutination of the neighboring leaflets or of a leaflet to the ventricular wall may occur; or, by extension, the integrity of adjacent structures may be seriously affected. Contraction of the edges of the valves at their angle causes narrowing of the orifice, with associate changes somewhat differing in character and effect in the different valves. Necrosis leads to ulceration, and often to the deposition of lime salts at the free edge, or at the points of attachment, or throughout the valve; the valve, in such cases, may have a "mulberry-like or jagged surface" and its insertion may be represented by a calcareous ring. The changes in the heart itself are dilatation of the heart cavities and hypertrophy of the heart muscle, the seat of these changes depending upon the valve which is affected; with it are noted enlargement of the papillæ and trabeculæ, with thickening and a dark-red, later grayish-red, color of the myocardium, thickening of the endocardium, and fibrous changes in the wall of the dilated auricle. In congenital cases the right side of the heart, especially the tricuspid valve, is affected; in acquired cases the left side more frequently suffers. The mitral valve is most frequently diseased; the aortic valve less often, the tricuspid valve occasionally, and the pulmonary valve rarely. The disease may be limited to one valve or it may simultaneously attack two valves, oftener the mitral valve and the aortic, or the mitral and tricuspid; simultaneous disease of the mitral, aortic and tricuspid valves is rare; simultaneous disease of all the valves has occurred in very exceptional cases only.

MITRAL INSUFFICIENCY.

Mitral insufficiency is the commonest form of valvular disease, occurring alone in about 40 per cent. of all cases, and in many more associated with other forms of valvular disease. It is usually secondary to rheumatic endocarditis, hence belongs chiefly to early adult life. It is due to contraction and shortening of the segments, generally with narrowing of the orifice, or to changes in the muscular wall of the ventricle,

which either produce sufficient dilatation to prevent perfect closure of the orifice by the valve or cause imperfect apposition of the segments during the systole (muscular incompetency).

Morbid Anatomy.—The imperfect closure of the valve causes regurgitation of a certain amount of blood from the left ventricle into the left auricle, leading to dilatation of the left auricle and hypertrophy of its wall; this, however, is never great. The left auricle containing the blood received from the lung and that regularly thrust back into it from the left ventricle, the latter, with each left auricular systole, has forced into it an abnormally large volume of blood; hence, dilatation of the left ventricle. Hypertrophy of the ventricular wall becomes a physiological necessity, to enable the left ventricle to bear the abnormal pressure. The backward pressure of the blood necessarily prevents complete emptying of the pulmonary veins, which become turgescient and dilated; pulmonary tension increases with the growing inability of the right ventricle to empty itself; the overburdened ventricle finally becomes exhausted and its walls yield, resulting in dilatation, often with remaining hypertrophy. The right auricle eventually undergoes the same change. In the lungs, the dilatation of both arteries and veins ultimately gives rise to "brown induration," at times atheroma. The ventricular hypertrophy may so fully compensate for the mischief done by the valvular incompetency that for an indefinite period, even many years, no disturbances are experienced. As soon, however, as the left ventricle becomes unable to do the heavy amount of work placed upon it, the lesser circulation becomes engorged and the action of the right heart much embarrassed. Finally dilatation of the right auricle results, the tricuspid valves cease to work perfectly and grow insufficient, and there rapidly follow engorgement of the systemic veins, cyanotic induration of the viscera and, frequently, dropsy.

While perfect compensation may be, and frequently is, maintained for many years, there is constant danger that it may at any time be broken by an unusual strain suddenly placed upon the heart, a fact the clinical importance of which is easily seen. When incompetency results from changes in the muscular structures, as impaired nutrition of the mitral and papillary muscles, such as occur in alcoholics, in persons suffering from

chronic Bright's disease, and in cases where there is habitual strain put upon the heart, the changes are practically identical with those produced by lesion of the valve itself, but compensation is much less perfect.

Symptoms.—There are no symptoms to betray the development of valvular lesion or its existence while compensation is maintained. Extra strain put upon the heart by some special exertion may, however, cause slight embarrassment of breathing when going up-stairs or walking rapidly. Certain symptoms mark the presence of pronounced incompetency; these are: a bluish appearance of the face, lips and ears from congestion of the veinules which may often be seen very plainly on the cheeks; shortness of breath; palpitation. These are not necessarily very pronounced, and they may be wholly absent; their presence, however, is significant. Many observers add the so-called "clubbed-fingers." There is in such cases a tendency to bronchitis and hæmoptysis which depends upon the existing pulmonary congestion. Compensation being broken, the heart's action at once becomes markedly irregular, rapid, weak and "fluttering;" often, just at the point of going to sleep, the patient is suddenly startled by a sensation as though the heart had stopped, or would stop, beating. There is much dyspnœa and, frequently, cough, which gradually grows worse, and is accompanied with watery or bloody expectoration. The effects of venous engorgement and stasis are marked. Dropsical symptoms develop, first in the feet, then extending upward and involving the serous sacs. There is enlargement of the liver and congestion throughout the portal system, with gastric and intestinal catarrh, some jaundice, scanty and albuminous urine, with casts and sometimes blood corpuscles. Proper treatment of the case may be followed by marked improvement, and the patient may remain comfortable for a considerable period of time, then again to develop the same train of symptoms. This may be repeated several times, death finally taking place from general dropsy or gradually supervening heart failure (asystole).

Physical Signs.—*Inspection.* Præcordial bulging and diffuseness of the cardiac impulse, especially marked in children and young persons. Apex beat displaced toward the left and downward (sixth interspace). When there is great dilatation of the

left ventricle, epigastric pulsation is often observed.—*Palpation*. Apex beat displaced, abnormally strong. Force of impulse feeble and wavy when there is insufficient compensation; strong and heavy when compensation is good. Pulse may be full and regular, but becomes disturbed and irregular from exertion and when compensation is poor.—*Percussion*. Increase of dullness, especially laterally, greater toward the left; increase of dullness in a lateral direction more marked than in any other valvular disease.—*Auscultation*. Systolic murmur at the apex, usually harsh and hard, and sometimes audible at some distance (six inches, or more) from the chest wall, partly or wholly obliterating the first sound. Sometimes the cardiac murmurs of mitral disease may be heard distinctly over a considerable portion of the cardiac region and at the back. The murmur varies in intensity, is increased from slight exertion, as change of position, especially from the horizontal to the vertical. A soft, sometimes presystolic, murmur is occasionally heard; in cases of extreme mitral insufficiency with great hypertrophy of both ventricles, loud and blowing murmur during systole. "An important sign on auscultation is the accentuated pulmonary second sound. This is heard to the left of the sternum in the second interspace, or over the third left costal cartilage" (Osler).

Osler emphasizes the following as the three important physical signs of mitral regurgitation: (a) systolic murmur of maximum intensity at the apex, which is propagated to the axilla and heard at the angle of the scapula; (b) accentuation of the pulmonary second sound; (c) evidence of enlargement of the heart, particularly the increase in the transverse diameter, due to hypertrophy of both right and left ventricles.

Diagnosis.—The diagnosis can usually be made without much difficulty. It must be remembered that often the history of the case is quite as valuable as the physical signs. Thus, the systolic murmurs above described are not entirely limited to mitral insufficiency, neither are they always sufficiently distinct to make differentiation between them and similar murmurs an easy task. Murmurs of hæmic origin may be mistaken for those due to mitral insufficiency, although they are softer and "musical," and more sharply localized; the expulsion of air from that portion of the lung which overlaps the heart pro-

duces a similar murmur, which is increased in volume after a full inspiration; an aneurismal murmur may cause embarrassment, and be recognized as such only from its following the aorta downward and from its being lost gradually instead of terminating abruptly. Complication of sounds also may exist and confuse; thus, as pointed out by Camman (Loomis, Physical Diagnosis) there may be an aortic obstructive systolic, with aortic regurgitant diastolic extending to the apex with the mitral regurgitant behind without a corresponding murmur in front. Idiopathic dilatation and hypertrophy of the heart and arterio-sclerosis with dilated heart present especial difficulties of differentiation from mitral incompetency.

MITRAL STENOSIS.

Mitral stenosis or narrowing of the mitral orifice ranks next to mitral insufficiency in the frequency of its occurrence. Very rarely it is congenital; in many cases no immediate cause can be found; but in the majority of cases it is the outcome of valvular endocarditis, usually dependent upon rheumatism, frequently subacute, or of chorea. It is more common in early life, and occurs oftener in women than in men. It frequently is associated with mitral insufficiency.

Morbid Anatomy.—The narrowing of the mitral orifice is due to thickening and contraction of the tissues composing the segments, chordæ tendineæ and ring or to calcareous infiltration of the ring, which may in large masses project into the curtain. The thickening and shortening of the chordæ tendineæ may be so extensive that the papillary muscles are inserted directly upon the valve. The shape and extent of the narrowing differs. A common form is the “funnel-shaped” variety, in which the deformity is the result of gradual adhesion at the edges and thickening of the chordæ tendineæ, the valve assuming the shape of a rigid funnel which projects into the ventricle, with the orifice just sufficiently constricted to barely admit the tip of a finger. In other cases the orifice is “slit-like” (Corrigan’s button-hole constriction). The changes in the heart are characteristic. Obstruction to the passage of the blood into the left ventricle results in dilatation of the left auricle with comparatively great hypertrophy; this distension of the left auricle leads to pulmonary congestion and tension; to overcome this,

hypertrophy of the right ventricle becomes a logical necessity. Eventually the dilatation of the right ventricle is so great that the tricuspid valve can no longer close the orifice (relative incompetency) and congestion of the systemic veins (general cyanosis) results. The labor of the left ventricle in a case of pure stenosis is often sufficiently reduced to result in atrophy; if mitral insufficiency exists with stenosis, a moderate degree of hypertrophy may be observed. Congestion of the pulmonary vessels, followed by important secondary changes (sclerosis), is highly characteristic of mitral stenosis. Thrombi are sometimes found in the left auricle.

Symptoms.—Since compensation may be maintained for years, no marked symptoms occur in the earlier course of mitral stenosis. The pulse, though usually small, is regular; breathing becomes somewhat labored upon exertion. There is, however, during this stage considerable danger from recurring attacks of endocarditis and from the results which follow the accidental entrance of a “vegetation” into the circulation. Failure of compensation is characterized by the same group of serious symptoms which is associated with failure of compensation in mitral insufficiency. A marked feature in mitral stenosis is the grave results of an incidental pleuritis or pneumonia, to which the existing pulmonary engorgement creates a special liability. General dropsy during the last stage is not so common as in mitral incompetency, but there is frequently, especially in children, great enlargement of the liver with ascites.

Physical Signs.—*Inspection.* Evidence of enlargement. The apex beat is not exaggerated. Pulsations in the epigastrium. After failure of compensation, feebleness of the præcordial impulse; often systolic regurgitation in the jugular veins.—*Palpation.* The peculiar “thrill” elicited by palpation constitutes one of the most reliable signs. It is the result of the vertiginous currents in the blood, and usually is felt best in the fourth or fifth interspace within the nipple line. It is variously described as of rough, grating quality or like a prolonged “cat’s purr”; it is presystolic, not constant, but, when present, highly diagnostic. The cardiac impulse is that of the right ventricle; it is felt most forcibly in the lower sternum, and grows very weak when dilatation of the right ventricle has become great. The radial pulse is small and often very irregular.—*Percussion.* Increase

of cardiac dulness toward the right, reaching to the right border of the sternum, and beyond it; if there is much enlargement of the right auricle, the area of dulness is extended upward. Collapse of pulmonary tissue or enlargement of the left heart, or displacement of the heart to the left, correspondingly affect the area of dulness.—*Auscultation.* The presystolic murmur is characteristic. It is a vibratory, prolonged, murmuring sound, heard at the inner side of the apex beat and transmitted only slightly toward the base; in exceptional cases this murmur is heard far toward the left. It is caused by the vertiginous currents set up in the blood as it is forced through the constricted, narrowed valvular opening, and, compared with the systolic murmur of mitral insufficiency, is less “blowing” and more rolling or “rippling.” It is in reality diastolic, but since it continues until the systolic contraction occurs, the term “presystolic” is commonly used. When the dilatation of the heart is sufficiently great to rob the diastole of due energy, this sound is no longer produced. Sometimes it is absent throughout. Another sign of much value is the sharpness and clearness of the first sound following the presystolic murmur; its cause has not been satisfactorily explained; it may be heard when there is no presystolic murmur. “The second sound at the pulmonic cartilage is loud and often ringing in character. Reduplication of the second sound is much more frequently noted than that of the first, and it has, therefore, a definite amount of diagnostic value” (Pepper). These signs fail as soon as the compensatory effort of the heart ceases.

AORTIC INSUFFICIENCY.

Aortic insufficiency occurs in from 30 to 50 per cent. of all valvular disease of the heart; it arises from disease of the valve segments or is the result of an abnormally large orifice which the smaller valve cannot close (relative insufficiency).

The *ætiology* embraces: Congenital malformations, as fusion of the segments; compensation may here be indefinitely maintained, but constant danger arises from sclerotic endocarditis. Distinctive changes, such as occur in the course of endocarditis; in the absence of such changes, (simple) endocarditis does not usually affect the aortic valve. More often aortic incompetency results from long-continued and severe strain put upon the

heart, as in running, rowing, and other sports; hence it is frequently called the "athlete's heart." Alcoholism and syphilis are also active factors; rheumatism is less important here than in mitral disease. The affection is seen oftener in men than in women, and belongs chiefly to middle age (fifth decade of life); cases of rheumatic origin occur oftener in the young.

Morbid Anatomy.—The valve itself is contracted, puckered, curled at the free edge; even slight "curling" may cause considerable incompetency. Gradually developing sclerotic changes give rise to rigidity of the structure, which may be rendered still more useless by calcification. There may be adhesion of the valve segment to the aortic intima and ulceration or rupture (trauma) of a segment, each sufficient to cause incompetency. The imperfect closure of the aortic valves allows a return current of blood from the aorta into the left ventricle; hence dilatation of the left ventricle and eventually hypertrophy. These here are very great; the papillary muscles are often completely flattened; the heart may reach an enormous size, weighing from thirty-five to forty ounces, and even more (*cor bovinum*). The mitral valves are rarely seriously affected, but relative mitral incompetency is not infrequent. Dilatation and hypertrophy of the left auricle usually occurs, and dilatation of the right ventricle is likely to supervene in cases of long standing. There is also interstitial myocarditis, localized or diffuse, followed by fatty degeneration. The arch of the aorta, more especially its ascending portion, is dilated and its intima sclerotic and atheromatous; the coronary arteries also may be atheromatous or their orifices occluded by atheromatous deposits, and these constitute important factors in producing the degenerative changes in the heart itself. Sclerosis of the arterial system is a marked feature and is attributed to the strain put upon the vessels during each forcible ventricular systole. Strong pulsations are felt even in the smaller and peripheral arteries of the body, and sometimes an arterial pulse may be felt in the liver through the abdominal wall. A peculiarity of the pulse in incompetency of the aorta is its rapid decline (Corrigan's pulse; *pulsus celer*). The large amount of blood thrown by the left ventricle into the arterial circulation gives to the pulse great force and high "ascent;" but the escape of blood, at the next ventricular diastole, into both the capillaries and back

into the ventricle, causes a very rapid and deep decline of the pulse, thus giving to the pulse of aortic insufficiency its peculiar "jumping" or "springy" quality. In very marked cases this backward wave makes itself felt even in the capillary circulation, and there may be noticed in such cases decided pallor of the finger nails at every diastole of the heart (Quincke's capillary pulse).

Symptoms.—In uncomplicated aortic insufficiency, especially in cases which follow endocarditis, compensation may be maintained for years and the patient enjoy good general health and be able to endure a fairly large amount of physical exertion. Struempell points out that in these cases the complexion is usually normal or pale, unlike the slightly cyanotic hue of mitral disease. If mitral incompetency is added, serious disturbances result earlier. As soon, however, as arterial sclerosis and changes in the myocardium take place, constitutional symptoms arise, usually with palpitation, increasing dyspnoea from exertion, headache, dizziness, flashes of light, faintness when rising quickly, anæmia, restlessness at night, inability to sleep when lying down, cough with occasional hæmoptysis, œdema in the feet, occasionally general dropsy, increasing weakness, with, toward the close, slight irregular fever, often with recurring endocarditis, death usually taking place suddenly. Compared with other valvular diseases, there is in aortic insufficiency a greater tendency to pain at the heart, even before failure of compensation; this pain is sometimes dull and aching, again sharp and lancinating, extending into the neck and (left) arm, and closely resembling attacks of true angina. Cough is very frequent and persistent, but hæmoptysis is not common as in mitral disease. There is a remarkable tendency to distressing dreams and anxious sleep. General dropsy is comparatively infrequent in uncomplicated cases. Toward the close of life the mental symptoms are pronounced, and delirium, hallucinations and morbid impulses, often of a homicidal character, are not uncommon. Sudden death occurs oftener here than in any other valvular disease.

Physical Signs.—*Inspection.* Protrusion in the cardiac region from the excessive hypertrophy of the left ventricle, most marked in the young. Strong, heaving apex beat, displaced downward and toward the left, at the sixth or seventh inter-

costal space and between the left mamillary and anterior axillary line. Often diffused, heaving tremor of the cardiac region. Violent pulsation of the cervical vessels and of even superficial vessels. Quincke's "capillary pulse;" alternate "blushing" and "paling" on gently pressing a finger-nail or on rubbing the forehead.—*Palpation*. Evidence of cardiac enlargement. Apex beat massive, heaving.—*Percussion*. Remarkable extension of cardiac dulness to the left, beyond the left mamillary line, and downward; also to the right, if the enlarged left ventricle has pushed the heart to the right or if the right ventricle also is enlarged. Moderate degree of dulness over the dilated aorta (at external end of second right intercostal space).—*Auscultation*. Long-drawn, distinct, but soft, blowing diastolic murmur to the left of the external end of the second right intercostal space over the upper part of the sternum. It is rarely absent. Occasionally it possesses a distinct musical quality and pitch, thought to be due to the vibrations during the diastolic movement of a tendinous fibre, the result of the wearing away of a valve. It is sometimes faintly audible at the apex. A short, rather rough, systolic murmur is often heard over the aorta, especially in case of aortic stenosis; it often is propagated into the neck. This is by some assigned to the roughness of the valve segments and of the intima of the arch, and by others to the fact that the current of blood from the left ventricle into the aorta meets and must overcome the backward current from the aorta through the incompetent valve. In case of extensive dilatation of the left ventricle with dilatation of the orifice and relative mitral insufficiency, a second murmur, rumbling in quality, limited in area, and exactly presystolic in time, is heard. It was first described by Flint, who attributes its occurrence to the fact that during diastole of the greatly dilated ventricle the valve segments cannot be pressed close back against the wall, but remain in the blood current, causing a certain amount of narrowing and the vibratory murmur described.

The importance of the visible pulsations in the arteries has already been mentioned. This pulsating motion of even the peripheral vessels partakes of a "jerking" character and may, by the ophthalmoscope, be seen in the arteries of the retina; pulsations are also noticed in the peripheral veins. The so-

called Corrigan's pulse has been described. "The pulse wave strikes the fingers forcibly with a quick jerking impulse, and immediately recedes or collapses. The characteristics of this are sometimes best appreciated by grasping the arm above the wrist and holding it up." A double murmur may be heard in the carotids and subclavians when it exists at the aortic orifice; the same occurs in the femoral artery, upon pressure.

AORTIC STENOSIS.

A rare affection, as compared with aortic incompetency. It may occur in the young as the result of union of the leaflets from rheumatic endocarditis, but commonly is found in old age, especially in men, in connection with extensive atheromatous changes in the arterial system. The valve segments in the milder form are adherent and stiff, with only slight thickening and few traces of sclerosis or atheroma; in more severe cases they are hard, like cartilage; if the disease is well advanced, they become a hard calcified mass which obstructs the orifice and permits the passage of blood by a roundish or slit-like opening. The term "relative stenosis" is used to describe a considerable dilatation of the aorta beyond the normal ring and valves.

Only a slight dilatation of the left ventricle occurs when the case develops gradually and incompetency is trifling. Eventually there may be marked hypertrophy of the wall of the left ventricle, but the chamber itself is not correspondingly enlarged ("concentric hypertrophy"). Later dilatation takes place, with thickening of the mitral valves, relative insufficiency, and dilatation and hypertrophy of the left auricle. Pulmonary congestion eventually results and increases the tendency to hypertrophy. Arterial changes occur, chiefly in the arch of the aorta, with, often, narrowing of the orifices of the coronary arteries and subsequent degeneration of the heart; but these changes are by no means as marked as those of aortic insufficiency.

Physical Signs.—*Inspection.* The apex beat is displaced downward, according to the degree of hypertrophy of the left ventricle; the slowed contraction of the ventricle and the absence of the backward impulse renders the beat weak. The pulse is small, weak, hesitating, but in the majority of cases

regular.—*Palpation*. Frequently a thrill is heard at the base of the heart, in the region of the aorta; when present, it is highly characteristic.—*Percussion*. Extension of the area of dulness to the left.—*Auscultation*. A “sawing,” long-drawn systolic murmur may be heard over the aorta, most distinct at the sternal end of the second intercostal space; it is propagated into the great vessels (aorta, carotids) and may be diffused over a large portion of the region of the heart. It, however, is not pathognomonic, since other conditions (roughening of the valves or aortic intima, hæmic states) may cause it. The aortic second sound often is feeble or wholly lacking. If there is marked incompetency of the valve, a diastolic murmur may or may not be heard.

The early constitutional symptoms are those of cerebral anæmia, as dizziness and fainting. Palpitation and pain at the heart may be present to a moderate degree, but do not in severity compare with those of aortic incompetency. Epileptic seizures may occur. In old people the symptoms are often those of disease of the arteries. Compensation having failed, the usual symptoms of advanced valvular disease are present. Generally speaking, the course of aortic stenosis is more unfavorable than that of aortic incompetency, but more favorable than that of mitral stenosis.

TRICUSPID INSUFFICIENCY.

Insufficiency of the tricuspid valve results from endocarditis or is relative; in the latter case the difficulty arises from an increasing dilatation of the right ventricle which prevents the meeting of the normal edges of the tricuspid valve. Organic insufficiency of the tricuspid may occur in foetal life, and is comparatively frequent in early infancy, growing more rare with advancing years. Relative incompetency is often secondary to disease of the mitral valve and to such conditions of the lungs as interfere with the pulmonary circulation (cirrhosis, emphysema, phthisis, chronic bronchitis). Tricuspid insufficiency in itself causes dilatation and hypertrophy of the right ventricle from the increased influx of blood into the right ventricle during diastole. Much more important, however, is the backward current which during every systole passes through the open tricuspid valve into the right auricle and from there into the ve-

nous circulation. The supply of blood to the pulmonary arteries, and the tension within them, is materially lessened. The more important symptoms are cyanosis, dropsy and those changes in the urine which pertain to valvular disease, often associated with disturbances of the respiratory organs. The symptoms of the associated lesions are, however, the most conspicuous. Gradual failure of the heart, with cardiac dropsy, or acute asystole may occur in cases complicated with cirrhosis of the lung or chronic emphysema.

Physical Signs.—The pathognomonic signs of tricuspid incompetency are the so-called *venous pulse* and the occurrence of a systolic murmur which is of maximum intensity in the lower sternum. The “venous pulse” arises from systolic regurgitation of blood into the right auricle, and assumes characteristic distinctness as soon as the valves guarding the veins become incompetent; its strength depends also upon the amount of regurgitating blood and upon the force of the ventricular contractions; if the latter are slight, the venous pulsation is, of necessity, faint. The jugular vein, especially on the right side, most distinctly shows this pulsation, and may be enormously distended, especially during the act of coughing. It is, however, no infrequent occurrence to see the pulsation transmitted to the subclavian and axillary or to smaller, superficial veins. In many cases the pulsation may be felt in the liver by placing one hand over the fifth and sixth intercostal cartilages, the other in the lateral region of the liver, in the mid-axillary line; the latter may even be heard when the jugular venous pulse cannot be felt, because the veins in the liver have no valves. The murmur over the lower part of the sternum arises from the regurgitating blood current. It is rather soft and low, extending over an area of distribution which varies greatly, sometimes being limited, while in other cases it may be heard high, toward the axilla, on the right side.

TRICUSPID STENOSIS.

This form of valvular disease occurs almost always in connection with disease of other valves, especially affections of the left heart. Clinicians differ as to its frequency, but all admit that it is rare as an isolated affection. The physical signs are great dilatation of the right auricle and a diastolic or presys-

toxic murmur over the right side of the heart, notably at the root of the ensiform cartilage or slightly to the right of it. The symptoms are chiefly those of marked cyanosis of the face and lips, especially pronounced after the supervention of dropsy.

PULMONARY INSUFFICIENCY.

A very rare affection which may be congenital (usually union of two of the segments) or the result of endocarditis after birth. Relative insufficiency is seen in connection with aneurism of the pulmonary artery. It is followed by dilatation and hypertrophy of the right ventricle and, in case of excessive dilatation, is complicated with tricuspid insufficiency.

The physical signs are very uncertain, being practically those of regurgitation into the right ventricle, and scarcely to be distinguished from the murmur of aortic insufficiency, "though the enlargement of the right ventricle, the establishment of tricuspid insufficiency and early cyanosis, and the absence of the water-hammer pulse would furnish strong indications of pulmonary disease. In addition, it is to be noted that the pulmonary murmur is loudest to the left of the sternum, the aortic to the right" (Pepper).

PULMONARY STENOSIS.

A very rare affection, usually congenital and associated with inflammation of the heart or foetal endocarditis. Occasionally cases occurring after birth have been recorded, showing union of the segments, with thickening, great narrowing of the orifice, and the vegetations of acute endocarditis. Compensation is maintained by hypertrophy of the right heart. The physical signs are exceedingly unreliable. There may be a systolic thrilling murmur, which is most distinct in the second interspace, to the left of the sternum, and *not* transmitted into the vessels. The pulmonary second sound is weak or replaced by a diastolic murmur.

The Symptomatology of the Valvular Lesions.—While compensation is maintained, little, and often no, complaint is made by the patient; this applies especially to incompetency of the aortic valve, much less to mitral insufficiency. In other cases

some slight difficulty of breathing is experienced or the physician may be consulted in regard to some minor but persistent ailment, without reference to the heart, and the true nature of which may not be suspected at this time. Later, dyspnœa increases, not in itself seriously annoying, but made much worse from slight physical exertion, a sudden start, or from nervous excitement; in mitral insufficiency this is an early and persistent symptom. There is also a sense of discomfort about the heart, with some irregularity of the pulse, and occasionally slight pain. As the compensatory power of the heart is weakened, there is increasing tendency to palpitation, irregularity of action, difficult breathing, more frequent and severe pain. Failure of compensation finally occurs from advanced disease of the valves, arterial disease, or failure of the heart's nutrition with resulting degeneration. It usually develops gradually, but may prove rapidly progressive when an acute infectious disease (typhoid fever, diphtheria, "la grippe") attacks a person suffering from valvular disease or if severe and prolonged strain is put upon the heart. Then the subjective symptoms promptly assume a serious aspect. The patient suffers from severe palpitation, sense of weight, pressure and constriction in the chest, and cardiac pain which in many cases partakes of the character and severity of an angina pectoris. The pulse becomes habitually rapid and irregular in the great majority of cases; dyspnœa steadily increases, and finally proves a source of constant and great distress. Failure of circulation shows itself in the duskiess of the complexion and cyanosis of the surface of the body; the inner organs suffer from stasis; dropsy develops, and the general health fails as the result of the widespread mischief arising from the heart lesion.

Dyspnœa is by all means the most distressing and constant subjective symptom. It may be present early in the case, and in disease of the mitral valves is particularly pronounced throughout. It deprives the patient of rest during the day and seriously disturbs his sleep at night, frequently obliging him to pass his time in an erect posture, even to get sleep, and sometimes assumes the form of a veritable "cardiac asthma" which may recur for years at irregular intervals. It depends upon a combination of causes, of which the most important are: obstructed pulmonary circulation; rigidity and lack of expansi-

bility of the pulmonary tissue, most marked in the advanced cases with cyanotic induration; great tension in the pulmonary circulation; œdema; compression of the lungs from hydrothorax or largely dilated heart; hæmorrhagic infarctions. Cheyne-Stokes breathing—alternating periods of breathing with periods of cessation of breathing—is frequently a feature of the last stage, particularly in cases with severe renal complications; it is more common in aortic disease and when there is degeneration of the myocardium. *The Heart.* The heart's action is usually somewhat accelerated and easily excited by transient causes. Sometimes it is regular to the last. An irregular pulse is more common in mitral disease; permanent slowing and infrequency is more often seen in aortic stenosis. Increasing irregularity of the pulse is a sign of failing compensation. A careful estimate of the value of the pulse beat demands that the ear be kept on the heart while the finger is at the wrist and that sphygmographic tracings be taken. Tachycardia, a suddenly appearing enormous acceleration of the pulse to 200, or more, beats per minute, accompanied with palpitation and distress, lasting for several hours and disappearing suddenly, is occasionally seen in mitral disease. *Pain* at the heart varies from a dull pain with a sense of fulness or oppression to a true angina; the latter occurs oftener in aortic than in mitral disease. It is relieved by rest. It is commonly associated with atheromatous disease of the valves and arteries (especially of the aorta), with high tension within the arteries and ventricles and degeneration of the myocardium. Pericarditis sometimes occurs as a dangerous complication.

The Effects of Stasis.—One of the first symptoms indicating a disturbed venous circulation is a cyanotic appearance of the skin, showing itself especially in mitral disease in slight duski-ness of the lips, ears, *alæ nasi*, cheeks and finger tips; in young subjects the face often is materially changed, the lips appearing thicker, the nose broader and heavier, and the complexion dusky; the finger ends are bulbous and the nails curve in; in older persons a fine net work of distended vessels may be seen on the nose, cheeks or extremities. In aortic disease there may be pallor, until mitral insufficiency becomes great. *Œdema* soon appears, beginning at the feet and creeping upward; it is common in mitral disease, rare in aortic disease without mitral

incompetency. At first it appears only temporarily, perhaps during the day, to disappear at night, but later it becomes permanent, transudation taking place into the abdominal, pleural, and other serous cavities. *Pulmonary stasis* is largely responsible for the dyspnoea of valvular disease. Cough is frequently present, especially when there is a tendency to chronic bronchitis, with watery and sometimes copious expectoration containing pigment matter from extravasated blood. Bleeding (stenosis of the mitral valve) may result if the congestion is great, and then affords decided temporary relief. *Congestion of the Liver* is followed by great enlargement of the organ, sometimes with pain; in some cases atrophy of its cells eventually occurs, and then the enlargement disappears. Moderate jaundice is frequent. Cyanotic induration of the liver may occur, offering serious obstruction to the portal circulation. The enlargement is greatest in tricuspid disease, and the jaundiced appearance of the skin most striking in mitral disease, on account of its mixture with the distinctly cyanotic hue. *Congestion of the Spleen*, with enlargement of the organ, felt under the edge of the ribs on the left side, occurs late. *Congestion of the Kidneys* is recognized by pain in the back and urinary changes. The urine is lessened in amount, of dark color and of high specific gravity, contains urates and albumin if the congestion is very marked. There may be acute or chronic nephritis. *Congestion of the Gastric and Intestinal Mucous Membrane* is characterized by catarrh of the mucosa, and is frequent in disease of the mitral valve.

Embolie Processes.—In the lungs: great and rapidly increasing dyspnoea, pain in the chest, hæmorrhagic sputa, extensive dulness, with weakened respiratory sounds and liquid râles.—*Cerebral Arteries*: transient disturbances of consciousness, palsy, apoplexy with permanent hemiplegia; sometimes epilepsy.—*Arteries of the Leg* (femoral and brachial): Coldness, blueness and blackness of the periphery of the affected part, with excruciating pain, gangrene and necrosis. The complication is rare and exceedingly serious, partly because of its effect upon the vital forces, partly because of the danger arising from septicæmia.—*Kidneys*: Sudden severe pain in the loins, with hæmaturia.—*Spleen*: Perisplenic pain and swelling; sometimes no symptoms.—*Intestines*: Embolism of the mesenteric

artery is rare. Sudden abdominal pain, intestinal hæmorrhage, rapidly developing collapse. Small embolisms of the skin may produce petechial eruptions. Thrombosis of the *veins* is followed by great distension, œdema and intense pain. Thrombi of curious shape have been found in both the auricles and ventricles of the heart.

The *nervous system* is affected oftener in aortic than in mitral disease, presumably the result of the impairment of nutrition from the circulatory disturbances set up by atheromatous degeneration. The symptoms most likely to be experienced are: vertigo and tinnitus aurium, especially from suddenly assuming an erect posture and from exertion; sudden faintings; severe headaches of a neuralgic character; restlessness and insomnia; psychoses, as melancholia, with suicidal tendency. Death in cases with a predominance of nervous symptoms is usually preceded by delirium, stupor and coma, with Cheyne-Stokes respiration.

The general symptoms present nothing characteristic, and the general health often is remarkably good. Fever is rare, save as it is connected with recurring endocarditis or some other complication. Secondary affections of the joints are sometimes seen, and a tendency to hæmorrhage, other than those noticed, has been observed. Thus *epistaxis* is not uncommon, especially in mitral stenosis; again, hæmatemesis and excessive menstrual flow occasionally occur.

Complications.—Irregularly recurring attacks of *acute endocarditis*, especially of the malignant form, are dangerous and should be suspected upon the sudden accession of fever.—*Pericarditis* may complicate any stage, but occurs oftener in aortic than in mitral disease. In the young it is not infrequently associated with endocarditis.—*Arterial Sclerosis* is common and serious, and may be the direct cause of degenerative changes not only involving the kidneys and other inner organs, but the heart itself.—*Nephritis* (uræmia), pleurisy, *pneumonia* (hypostatic), *chronic bronchitis*, œdema of the *lungs* and catarrhal inflammation of the gastric and intestinal mucous membrane may occur and unfavorably affect the course of the valvular disease.

Course and Prognosis.—The course of all valvular diseases is thoroughly chronic, and life, in the absence of complications,

may be indefinitely prolonged. Sudden death from valvular disease is by no means as common as is supposed by the uninformed, neither are the people suffering from it incapacitated from participation in the common duties and pleasures of life so long as they are prudent and avoid excess in living, severe exposure to inclemencies of weather, and violent exercise or great muscular exertion. Unfavorable conditions are: great cyanosis; special liability to catarrhal or rheumatic affections; tendency to disease on part of the blood-vessels; the occurrence of acute infectious diseases; lesions of the pulmonary tissues; marked congestion of the internal organs, especially of the lungs, liver and kidneys. Sex and age somewhat affect the prognosis. In women, all things considered, valvular disease runs a more protracted and favorable course than in men, chiefly because the latter are more constantly exposed to the operation of unkindly influences. Pregnancy and labor undoubtedly present dangers of their own in case of valvular affection, but such women often rear a large family of children and live an active life. The liability of severe strain upon the heart during severe labor is great, and its effect depends upon the existing degree of compensation. Children less than ten years old constitute a bad class of patients, since in them valvular lesions seem to progress with great rapidity and excessive hypertrophy and dilatation; this tendency is much less pronounced if the disease appears at or near the age of puberty. The unfavorable conditions which surround the children of the poor greatly increase the probability of a fatal termination. All things considered, the value of the prognosis here rests upon a careful estimate of all the conditions surrounding each individual case, with due allowance for complications, such as are liable to arise at any time. Compensation is usually more permanently and completely effected in insufficiency of the mitral and aortic valves than in stenosis. Tricuspid insufficiency is so largely the result of failing compensation in mitral disease that its recognition makes the prognosis grave; in stenosis of the tricuspid Fenwick's table of 46 cases shows a duration of life of from 31 to 36 years. Mitral insufficiency runs a long course, and a high grade of compensation is often maintained for 30 to 40 years, with ability to perform all the common duties of life. The course of the affection is, however, ex-

ceptionally rapid in children, and examination after death shows that there is usually extensive puckering and curling of the segments, thus forming a narrow strip around a wide mitral ring. In mitral stenosis special danger exists of cerebral embolism. In aortic insufficiency the prognosis is very serious, and sudden death may occur from acute dilatation during a violent exertion or from blocking of one of the coronary arteries.

The prognosis is good, as to duration of life, if the dilatation and hypertrophy are moderate, if there is slight or no cardiac distress, and in the absence of arterio-sclerosis or involvement of the coronary arteries.

Treatment of Valvular Disease.—The treatment of valvular disease divides itself into (1) such measures as during the stage of compensation will prolong this condition of comparative safety and comfort, and will prevent, so far as possible, any act on part of the patient which will break compensation; (2) such measures, when compensation is broken, as will reduce existing danger to life, support the heart, and relieve special symptoms and danger. Throughout, the necessity of preserving the muscular tone of the heart is evident. To accomplish this, it may be necessary to insure the intelligent coöperation of the patient by frankly informing him of his condition and pointing out the fact that his fate is largely in his own hands. In making this statement, candor must be tempered by good judgment and gentleness of speech, lest well-meant and necessary advice do more harm than good by leaving upon the mind of the patient the conviction that he is doomed. It is a task of much delicacy, and in attempting to perform it the strongest possible emphasis is to be placed upon the fact that the exercise of patience and sound judgment may not only prolong life and usefulness beyond the average, but may result in what is almost equivalent to a cure. It is evident that everything likely to weaken the heart must be avoided, and that everything likely to strengthen it must be done with religious perseverance. Over-exertion and indolence are alike dangerous, the former from the immediate harm it may do, the latter from the mischief sure to arise indirectly. A moderate amount of well-regulated exercise is absolutely necessary to maintain a needful degree of muscular energy, of the heart no less than of any

other muscle; in fact, excellent results in the treatment of valvular disease have been obtained by systematic exercise with the sole view of developing increased muscular force of the heart. As a general rule in these cases, moderation in everything is of supreme importance. The patient must be made to thoroughly appreciate this; a great point is gained if he can do so without becoming a hypochondriac. Thus he must guard against violent physical exertion, must keep in check his emotions, and control his appetites. Stimulants, especially tobacco, have their dangers, yet with due precaution need not be prohibited. Sexual indulgence, unless tempered with prudence, involves considerable risk in persons suffering from aortic insufficiency. Abundance of sleep is exceedingly helpful in that it not only enables the heart to rest, but allows it to accumulate and store muscular energy. Short baths in cool or tepid water are usually of benefit; hot baths are less safe, and Turkish baths are absolutely forbidden. The bowels should be kept regular, and high altitudes must be avoided. A change of residence is frequently very desirable, if this provides for a life in the open air and at a low elevation. The exhibition of heart tonics at this stage is unnecessary and unjustifiable.

The period of broken compensation makes heavy demands upon the resources of the most skillful physician. Rest is indispensable, and during the times of acute exacerbation which so frequently occur, or when acute dilatation has resulted from some accident, it must be absolute and prolonged. Experience has unquestionably proved that absolute rest alone may fully restore compensation. The embarrassment of the circulation which so quickly shows itself may be met by venesection, depletion through the bowels, or the exhibition of remedies which have a sustaining, stimulating action upon the heart. Venesection is strongly recommended by Osler and other clinicians of large experience, especially in acute dilatation and cyanosis in connection with emphysema, the amount of blood to be withdrawn varying from twenty to thirty ounces; others prefer leeching, and still others object to bleeding in any form and under all conditions. Depletion through the bowels is serviceable in cases with dropsical tendency, and is insured by the administration, a half-hour, or more, before breakfast, of an ounce, or more, of Epsom salts in strong solution, as advised

by Matthew Hay. The strength of the patient will determine how long this may safely be continued. Of remedies exhibited at this time the most important is DIGITALIS. It not only stimulates the heart-muscle, slowing its beat and increasing the force of its contraction, but also the activity of the circulation, and thus insures with equal efficiency the feeding of the heart muscle. It is useful in all forms of valvular disease during the stage of broken compensation, but is especially serviceable in mitral disease, with small irregular pulse and cardiac dropsy. From ten to fifteen drops of a good tincture or one-half ounce of the infusion may be given every three hours for two days, with a reduction in the dose after that, in case of cardiac dropsy. If the drug acts well, the amount of urine passed will be materially increased in about twenty-four hours. It must be discontinued as soon as compensation has been reëstablished. When there is no dropsy, smaller doses (from two to five drops every two to three hours) will exert a most desirable tonic action upon the heart muscle and answer every purpose; but "attenuations" in the present case, where purely physiological effects are desired, lead to a reckless waste of time and of precious opportunities. Many recent authorities deny the cumulative action of DIGITALIS by the manifestation of acute symptoms, but all admit that the drug is very slowly assimilated and eliminated. It should, therefore, never be given for a longer time than is necessary to reëstablish the disturbed compensation, and its effects should be closely watched, especially if there is no increase of urine under its exhibition; it must be promptly withdrawn if the pulse falls below 85 or 80. Toxic action usually manifests itself in nausea and vomiting, small and irregular pulse, great lessening of the urinary secretion, and, especially in mitral stenosis, under the influence of DIGITALIS, the occurrence of two beats of the heart to one of the pulse (Broadbent).—STROPHANTHUS in doses of five to ten drops, given at intervals of three or four hours, "steadies" the heart, and often does good work when DIGITALIS acts unsatisfactorily; its chief value, however, lies in the fact that it is a good substitute for DIGITALIS when it becomes advisable to suspend the exhibition of the latter for the time being. Gottlieb is responsible for the statement, quoted by Whittaker, that he has never seen so many patients

who have lived for years with heart disease die suddenly under any other treatment as after the use of STROPHANTHUS. It should not be given to aged persons. Other important substitutes for DIGITALIS are: CONVALLARIA, ADONIS VERNALIS, NERIUM OLEANDER and EUONYMUS ATROPURPUREUS. Many practitioners deny the reliability of these "new" remedies, but hardly upon sufficient grounds. CONVALLARIA is of especial value when there is much pulmonary congestion, dyspnœa and orthopnœa, associated with great mental irritability and excitement. Hale lauds it highly for its "marvelous" power to remove dropsy, save, perhaps, in cases with symptoms of albuminuria; its use in Russia for dropsical affections is well known. It must be given in increasing doses, beginning with ten to twenty drops of the fluid extract every two hours.—NERIUM OLEANDER reduces the frequency of the respirations, gives to the pulse regularity and firmness, increases the secretion of urine and its solid constituents, and has a salutary effect upon the œdema, dyspnœa and palpitation of the heart; it also regulates the action of the bowels.—EUONYMUS increases the power and the amplitude of the contractions of the heart, and, according to Hale, is especially useful when there is congestion of the liver and jaundice.—ADONIS VERNALIS resembles DIGITALIS and STROPHANTHUS. It increases arterial tension and in large doses arrests the heart in diastole. Sometimes it causes vomiting and diarrhœa, but only after large doses. The increase of arterial pressure is accompanied with an increased urinary flow. It has given prompt relief in dyspnœa and cardiac dropsy. The tincture may be used in doses of five to ten drops every three or four hours, or the active principle, adonidin, may be exhibited in doses of gr. $\frac{1}{20}$ to gr. $\frac{1}{5}$ at the same intervals.

By an intelligent use of these heart-tonics, of which DIGITALIS is by all means the most reliable, and especially by abstaining from their exhibition unless it is pointedly demanded and discontinuing their use as soon as they are no longer needed, much may be accomplished in affording relief and in spinning out life. To these drugs STRYCHNIA and NUX VOMICA should be added. STRYCHNIA has less effect than previously named drugs upon the irregularity of the heart, but is a profoundly acting stimulant and tonic to the muscular fibre anywhere; to

act as such here, it must be given in drop-doses, or more, of a one per cent. solution. Other, and even more powerful, heart-stimulants may be used to meet special emergencies and will be discussed in their proper connection.

Special Symptoms.—*Palpitation* and *pain* at the heart. The application of cold over the region of the heart usually relieves the throbbing and palpitation. Leiter's coils are in common use for this purpose, but a flask filled with ice water answers the purpose equally well. If there is much cardiac distress, AMYL NITRITE (from two to four drops on a handkerchief, inhaled) or NITRO-GLYCERINE (one to three drops of a one per cent. solution) may be exhibited; counter irritation (small blisters or mustard draughts over the heart) frequently answers the same purpose. In such cases careful attention must be paid to diet, with the view of excluding any article of food which may create flatulency.

In very many cases the homœopathically indicated, attenuated remedy proves of inestimable value here. Those most frequently indicated are AMYL NITRITE (3x): Tumultuous action of the heart, with violent pulsation of the carotids; sense of great anxiety and constriction in the cardiac region; great flushing and fulness of the face; must have fresh air.—ARSENICUM. The heart's action is weak, irritable, easily excited. Dropsical tendency. Intense oppression about the heart, with great difficulty of breathing; sense of tightness about the heart. Characteristic restlessness, great pallor, etc.—ASA FÆTIDA is of great value when the attacks of cardiac pain are associated with flatulency and, in women, with nervous symptoms of a hysterical character. The heart's action is weak and rapid; there is a sensation of trembling about the heart, with vague pressure and faintness. The cardiac pain often is severe, stitching.—CACTUS. Palpitation, labored breathing, sense of suffocation, cold sweat; cardiac dropsy. Sense of excessive constriction about the heart, as though grasped in an iron hand or squeezed in a vise.—DIGITALIS (3x). Feeble, irregular pulse, fluttering; sensation as if the heart would stop beating, and feeling of anxiety which compels him to draw in a long breath; skin cold and pale. Cardiac dropsy.—GLONOINE. Fluttering and violent beating of the heart; it seems as though it would burst the chest; violent, labored action of the

heart, with violent pulsations which are felt to the tips of the fingers; cardiac pains radiate in every direction, even into the arms. Faintness, weakness, trembling.—*LACHESIS*. Palpitation; sense of suffocation as though proceeding from an expansion of the heart; sense as though the heart were turning over. Pain and numbness in the left arm. "It is extremely useful in atheromatous arteries and in chronic aortitis, with terrible dyspnœa" (T. F. Allen). Hypertrophy of the heart. Angina pectoris.—*OXALIC ACID*. Sharp, short, stitching pains, confined to a small spot, made worse from even the slightest motion; palpitation, usually coming on from lying down at night; numbness in the back and limbs.—*SPIGELIA*. Irregular, tumultuous action of the heart, with sharp, stabbing pain in the heart, extending into the arm; great nervousness; during recurring attacks of inflammatory action about the heart.—*TABACUM*. Dilatation; sense of extreme weakness of the heart-muscle; feeble and irregular pulse, deathly faintness, cold clammy sweat and sense of utter relaxation; nausea and extreme "goneness;" the face is haggard and the extremities cold. Pains radiating from the centre of the chest. Tightness in the chest, with feeling of suffocation, especially at night.

Dyspnœa frequently becomes so distressing that urgent demands for immediate relief cannot be ignored. It may be continuous, with sharp paroxysms of exaggeration. If occurring nightly and associated with restlessness, morphia is highly recommended as prompt, reliable, and safe. Whittaker speaks earnestly of the beneficial action of quinine. In many cases the common cardiac stimulants act promptly. When there is much tension in the arterial system, nitro-glycerine in light, but increasing, doses of a one-per-cent. solution frequently relieves. *CONVALLARIA* has done good work in my hands; amyl nitrite has proved of slight, if any, service. Chloroform, cautiously given, may afford rest and at least temporary relief. Cold compresses to the chest occasionally act well. When dyspnœa arises from œdema of the lungs, it is usually intensely distressing, and here caffeine is especially indicated, more particularly when there is scanty secretion of urine from inactivity of the heart. It may be given in light doses (gr. $\frac{1}{2}$ to 1) at intervals of one or two hours; in fact, small and frequently repeated doses of caffeine give the best results. Large doses of the

citrate (grs. 30 to 40 per day) have been well borne. Occasionally good results are obtained by a cupful of strong black coffee to which a teaspoonful of cognac has been added.—Diuretin (sodium salicylate theobromine) has of late been considered a valuable analogous preparation. Whittaker advises its use "in cases of heart weakness marked by arrhythmia and dropsy when digitalis has been used without effect or is contra-indicated for any cause." It affects the heart-muscle itself, and under its use dropsy often disappears in a few days. It should be given in fifteen-grain doses of the powder, in seltzer water, every four hours. Hale recommends codea phosphate (gr. $\frac{1}{4}$ to $\frac{1}{2}$) when morphine is not well borne; it is, like morphia, given hypodermically.

Dropsy occurs often and proves difficult of management. The remedies likely to be of value are the heart stimulants, led by DIGITALIS. Remedies whose action is centered upon the kidneys, stimulating the secretion of urine, are of no great service here.—APOCYNUM CANNABINUM and STIGMATA MAIDIS may prove useful, but must be given in physiological doses. Hydragogue cathartics are undoubtedly indicated, for they meet the rational indications: depletion of the blood and promotion of the absorption of the fluid. Of these, ELATERIUM is valuable on account of the promptness of its action. It may be given in light doses (1x or 2x of ELATERIN) every three or four hours. Both citrate of caffeine and diuretin are highly useful; excellent effects, in the experience of the dominant school, have followed the administration of calomel in 3-grain doses, three times daily. Milk diet is highly recommended. These means having failed, scarification under antiseptic precautions becomes necessary to provoke the slow escape of large amounts of serum.

Gastric Symptoms are usually the result of venous engorgement and catarrhal irritation. The nausea and vomiting often are persistent. Of the remedies symptomatically indicated I have had the best results from ARSENIC, IPECACUANHA and HYDROCYANIC ACID. KREOSOTE, HYDROCYANIC ACID and OXALATE OF CERIUM are recommended by Osler. Bits of ice, milk-and-lime water, and iced champagne frequently are very soothing, and they may be borne when the stomach will tolerate nothing else.

Sleeplessness adds to the suffering which arises toward the termination of valvular disease. Making all due allowance for the strongest arguments to be advanced against the use of hypnotics and narcotics, the stubborn fact remains that the finest-spun theories often melt into nothingness when brought face to face with experience in the sick room. In the present case all that can be done to remove the immediate cause of sleeplessness must be done patiently and perseveringly, and often much can be accomplished in that direction by the indicated remedy; but if these measures prove insufficient, and the expedient of trying various arrangements of bedding to secure comfortable position of the sick, with a hot toddy at night, or a dose of spirits of chloroform, have all failed, then recourse must be had to hypnotics, preferably morphine.

Diet.—Avoid all food which creates a tendency to flatulency, as fats and carbo-hydrates; on the other hand, coarse foods which are likely to set up fermentation are also objectionable. Neither is it wise to encourage the use of “bulky” foods and of liquids in large amounts. White meats, beef-juice, scraped beef quickly broiled, fish, eggs and egg-albumen, and milk are excellent. If accustomed to the use of wine, the lighter wines may be taken moderately, especially in those of advanced years; but alcohol, tea and coffee possess qualities which render them dangerous to persons suffering from valvular disease, and if allowed at all, they must be taken very weak and with great caution.

HYPERTROPHY OF THE HEART.

The term “Hypertrophy of the heart” is used to describe an enlargement of the organ from thickening of its muscular walls. The hypertrophy is *simple* when there is no enlargement of the cavities of the heart; *eccentric*, when the chambers of the heart are dilated; *concentric* when the chambers of the heart are diminished in size; the latter is probably a *post-mortem* change, due to rigidity and contraction after death.

Ætiology.—Thickening of the heart-muscle is due to increased work of the organ and depends upon the maintenance of increased nutrition. The conditions demanding increased muscular effort on part of the heart are: Obstruction in the gen-

eral arterial system (aortic hyperplasia, aneurism, arterio-sclerosis with or without renal disease). Obstruction in the pulmonary circulation (pulmonary cirrhosis and emphysema; compression of the lungs, as from chronic pleurisy or curvature of the spine). Obstruction in the heart itself (valvular disease, pericardial adhesions, sclerotic myocarditis). Excessive action of the heart (athletic exercises). The specific action of certain poisons (tobacco, alcohol, tea) and obesity, including the excessive use of beer.

Osler's tabulation shows that general enlargement of the heart or of the left ventricle alone results from: disease of the aortic valve; mitral insufficiency; pericardial adhesions; sclerotic myocarditis; disturbed innervation, with over-action of the heart; general arterio-sclerosis; increased arterial tension by contraction of the small arteries, necessitating greater exertion on part of the heart to force the blood through the general circulation; prolonged muscular exertion; increasing arterial blood-pressure; narrowing of the aorta. Hypertrophy of the left ventricle arises from: lesions of the mitral valve; pulmonary lesions with obliteration of pulmonary blood vessels; sometimes valvular lesions on the right side; chronic valvular lesions of the left heart; pericardial adhesions.

Auricular hypertrophy is always attended with dilatation. The left auricle is hypertrophied and dilated in lesions of the mitral orifice; the right auricle from increase of blood pressure in the lesser circulation (mitral stenosis, pulmonary lesions) or, more rarely, from narrowing of the tricuspid orifice.

Morbid Anatomy.—The most striking feature is the increase in the weight and size of the heart. The former is especially significant. The average weight of the normal heart is from eight to nine ounces; the hypertrophied heart may weigh from sixteen to twenty ounces, and cases are on record in which fifty-three, fifty-seven and sixty-four ounces were attained. The enlargement of one or the other of the chambers of the heart necessarily changes the shape of the organ; usually the apex is much broadened. Great enlargement of the left ventricle gives to the heart an elongated, and extensive hypertrophy of the right ventricle a widened, appearance. Hypertrophy and dilatation of both ventricles results in the so-called *cor*

bovinum. The muscle is deep-red, firm, and cuts with much resistance; the right ventricle especially, when hypertrophied, becomes leathery. There is enlargement of the papillæ and trabeculæ, and flattening of the papillary muscles when there is much dilatation.

Symptoms.—During the state of simple hypertrophy few symptoms, perhaps not any, may be experienced; this applies especially to persons whose nervous system is well balanced and who do not use tobacco or stimulants. A sense of weight and fulness in the chest, with some constriction about the heart, is often felt, associated with more or less dyspnœa and, in some cases, a clear consciousness of the cardiac impulse. Many of these symptoms become much exaggerated when lying on the left side, in bed, and then the patient can only sleep on the right side. While lying on the left side he feels the impulse of the heart (“thumping”), is conscious of fulness in the cardiac region, experiences an annoying sensation as if the heart were beating in the ears, and grows nervous and apprehensive of danger. This state of nervous excitement in itself reacts upon the heart, and in many cases results in violent and prolonged palpitation; in others, change of position to the right side leads to a gradual disappearance of these symptoms, and the patient gently drops to sleep. There is not usually much pain at the heart, save in those who use tobacco excessively and in neurasthenics. There is sometimes much headache of a congestive type, with flushing of the face, throbbing of the vessels of the neck, noises and ringing in the ears, flashes of light before the eyes, and strong, full, resistant pulse. In such cases nasal, and even cerebral, hæmorrhage may occur. Tendency to cerebral hæmorrhage depends upon the continuously maintained high blood pressure which eventually leads to arterio-sclerosis.

Physical Signs.—*Inspection.* There is bulging in the præcordial region, especially noticeable in children; widening of the intercostal spaces; increase of the area of cardiac impulse downward and outward; in marked cases the cardiac impulse is visible.—*Palpation.* The impulse is strong and heaving; slow and deliberate in simple hypertrophy, sudden and abrupt in eccentric hypertrophy. A second, weaker impulse is often felt at the apex or over the root of the aorta. The apex is dis-

located downward and outward, as low as the sixth or eighth interspace.—*Percussion*. Increase of the area of dullness downward and outward, especially transversely (frequently transverse dullness of four inches, or more).—*Auscultation*. No abnormal sounds may be detected in the absence of valvular lesions. Often the first sound is prolonged and dull (may be clear and sharp in eccentric hypertrophy), and there may be reduplication. In young people Lænnec's metallic clink may accompany the first sound. The second sound is strong, often ringing or reduplicated in the aortic region. The *pulse* is strong, full, regular, with high tension; if there is dilatation, it is full, but more rapid and with less tension, becoming intermittent and irregular as the heart fails.

Hypertrophy of the right ventricle has bulging of the lower thorax, sometimes a tumor-like fulness in the epigastric region, with displacement, often of the apex beat to the left. Increase of cardiac dullness transversely and toward the right, sometimes an inch beyond the sternal margin. The cardiac impulse is comparatively weak and diffuse. Auscultation reveals an abnormally loud first sound, which, in the eccentric form, is clear and sharp; the second sound is accentuated and reduplicated in the second left intercostal space. The pulse is usually soft and weak.

The physical signs of hypertrophy of the auricles are, as a rule, indistinct, since the condition is almost always associated with ventricular enlargement.

Diagnosis.—The diagnosis depends upon the forcible, heaving heart impulse, the accentuation of the second sound at the base, and the increased area of dullness. The latter, however, is also found in pericardial effusion, aneurism, and in displacement of the heart forward against the chest wall. An abnormally forcible beat of the heart, without hypertrophy, is heard in cases where the heart is unusually exposed, as in case of imperfectly developed lung or of contraction or retraction of the lung by disease (cirrhosis, pleuritic adhesions, or phthisis). In either case the absence of the "heaving" character of the cardiac impulse and of the characteristic dislocation of the apex beat, with the positive evidence of pulmonary or other lesions, will determine the diagnosis. In nervous palpitation the impulse of the heart is often forcible, but never heaving.

Prognosis.—Hypertrophy of the heart once established, a cure is out of the question, save in cases where the hypertrophy is moderate and depends upon transitory causes, as pregnancy, acute Bright's disease, the tobacco habit, etc. Such cases, however, are exceptional. The important point is to maintain perfect compensation, and to that end proper nourishment of the heart and avoidance of anything that throws upon it extra work must be made the object of special care. Conditions which render the prognosis unfavorable are anæmia and general debility, arterio-sclerosis and intercurrent acute febrile diseases, which in cardiac dropsy are frequently followed by myocarditis and degenerative changes of the heart muscle. Very severe muscular exertion and violent emotions often cause sudden breaking of compensation.

For treatment consult the chapter on valvular diseases.

DILATATION OF THE HEART.

Dilatation of the heart in the great majority of cases depends upon the operation of two factors: increased pressure within the heart and impaired power of resistance. Increased pressure within the heart may be due to the existence of obstacles to the flow of blood or to the presence of an abnormally large amount of blood in the heart chamber; in either case an extraordinary effort is necessary to meet the emergency, always involving the certainty of eventual exhaustion of nervous and muscular energy and probable degenerative changes in the heart muscle. Like other muscles, the heart by systematic training may be so developed as to become capable of enduring an unusual amount of exertion, as in athletes, whose success depends largely upon developing this faculty; but if carried too far, "overtraining" brings dangers of its own. In persons of average capacity and health any special strain upon the heart is always dangerous; the risk of permanent injury is greatly increased in those who are not rugged or who are poorly nourished. Impaired power of resistance is the immediate outcome of impaired nutrition of the heart-muscle, and in its milder forms is seen in anæmia, leukæmia and chlorosis. More often it is the effect of myocarditis or degenerative changes which occur in connection with certain acute infectious fevers,

as typhoid and scarlet fever, and in endocarditis, pericarditis, especially with extensive adhesions, and in sclerosis of the coronary arteries. Aside from these, cases occasionally occur in which the affection appears idiopathic; in some instances no cause can be assigned, while in others there is a history of a powerful emotion or of some violent physical effort, soon followed by dyspnœa, cough, pain and circulatory disturbances, either terminating fatally in a few days or becoming chronic. Another type has been described under the term "irritable heart;" it is usually seen in middle-aged men of good general health, engaged in occupations which require great physical efforts and who use stimulants freely; it is common among the men employed in and about breweries, who habitually drink enormous amounts of beer daily. The symptoms here are those of cardiac irritability, with frequent spells of violent palpitation and dyspnœa, rarely much pain; there are no characteristic *post-mortem* appearances.

Morbid Anatomy.—Usually dilatation involves one or more chambers of the heart, and is associated with hypertrophy; all the chambers of the heart may be greatly distended in aortic insufficiency. There may be thinning of the heart-wall; if so, there is increase in the size of the organ without increase of weight. The right side is affected oftener than the left, partly because of the frequency of pulmonary disease as an ætiological factor. The conical outlines of the heart are usually lost, the organ appearing rounded. There is dilatation of the auriculo-ventricular rings, enlargement of the valvular orifices, and relative valvular incompetency, with regurgitation. The orifices of the venæ cavæ and pulmonary veins may be greatly distended, the former especially so when there is tricuspid incompetency with dilatation of the right auricle. The endocardium is usually opaque; the muscle may be normal or reddish-gray or yellow in color, from parenchymatous or fatty changes. It is presumed that the ganglia of the heart undergo important degenerative changes, but as yet these are not understood. The affected chambers of the heart frequently contain large blood-clots which may extend into the vessels.

Symptoms.—The symptoms of acute dilatation are: weak, rapid, irregular pulse; dyspnœa; obstructed venous circulation; sometimes cardiac pain. Gradually developing dilatation

of the heart presents the general picture of valvular incompetency. The *physical signs* are such as suggest an enlarged, enervated organ, the various sounds produced being accompanied and obscured by the murmurs which arise from the incompetent state of the valves. The impulse of the heart is diffused, weak, wave-like, and frequently without a point of maximum intensity; Walshe has called attention to the fact that the latter may exist and be even visible, but cannot be felt. An area of cardiac dulness is observed when great hypertrophy is associated with dilatation. The sounds of the heart, with increasing dilatation, show less and less difference in distinctness, and the pause following the second sound is shortened, resembling the beat of the foetal heart (embryocardia); the galloping rhythm (bruit de galop), frequently heard, is especially characteristic of dilatation. The action of the heart is markedly irregular and intermittent, and any form of arrhythmia may be present. The pulse is small, weak, and rapid.

The diagnosis of dilatation is practically that of advanced valvular disease.

The prognosis is serious, but cases which depend upon curable causes may recover under appropriate treatment of the primary disease. Acute dilatation may prove fatal within a few days. In chronic cases the outlook is discouraging and grows less hopeful as the dilatation increases.

The treatment is that of valvular disease of the heart.

DISEASES OF THE MYOCARDIUM.

ATROPHY OF THE HEART.

An abnormally small heart, small in size and weight, is almost always the result of impaired nutrition, whether general or local. To the former belongs the cardiac atrophy of old age and of wasting disease (cancer, phthisis, diabetes, etc.); to the latter the limited forms of atrophy affecting only a portion of the heart, resulting from the pressure of a tumor, from pericardial effusion, or from obstruction to the coronary circulation. The condition may be congenital, due to aplasia (lack of

development), in which case evidence of stunted growth is seen elsewhere, as in the smallness of the arteries and the imperfect development of the genitalia (chlorotic young girls). It is also occasionally seen in men suffering from hæmophilia. The reduction in the size and weight of the organ may be very great; thus in the case of an adult under Bramwell's observation the heart weighed less than three ounces. The heart loses its subpericardial fat, the surface appears shriveled and wrinkled, the muscular tissue pale or dark-brown, ochre-like ("brown atrophy"), the fibres present more or less evidence of granular or fatty degeneration, and the valves are thin and slender.

Since in nearly every case the heart is able to meet the constantly lessening demands made upon it, no serious disturbances are produced. The physical signs are simply those which must result from the reduced size and the weakness of the organ, as: diminished area of cardiac dulness; weak and impalpable apex beat; small and weak pulse. Abnormal heart sounds are rarely present. The affection is not easily recognized with any degree of certainty; the prognosis and treatment are that of the general affection of which the cardiac atrophy is a local expression.

Enlargement (hypertrophy and dilatation) of the heart has been discussed in connection with valvular diseases.

ACUTE MYOCARDITIS.

Inflammation of the interstitial tissue of the heart-muscle is diffuse or localized. Diffuse myocarditis oftenest occurs in connection with acute infectious fevers, as typhoid fever, diphtheria and scarlet fever, and with septic processes. It is also, but more rarely, a result of an existing pericarditis or endocarditis. It usually affects the left ventricle and involves more or less extensive areas. In some cases the inflammation is confined to the papillary muscles, in others to the muscular rings surrounding the valvular orifices (mitral and tricuspid). It terminates in resolution, chronic fibroid myocarditis, rarely in endocarditis or pericarditis, very exceptionally in suppuration. The characteristic anatomical changes consist of softening of the heart-muscle, which at first is of a dark-red color with

points and dots of hæmorrhagic injection; later the appearance is yellowish-red and mottled, and finally yellowish-gray. Microscopically there is granular or fatty degeneration of the muscular fibre, sometimes hyaline transformation. A transverse division or "segmentation" of the fibres is frequently seen *post-mortem*. A localized or suppurative myocarditis also occurs in connection with acute infectious diseases, but is much oftener the result of infection with the micro-organisms of suppuration carried to the heart from suppurative disease of the endocardium or pericardium, or as emboli in the branches of the coronary arteries in puerperal septicæmia, suppurative phlebitis, etc. The heart-muscle, upon section, is seen to be covered with numerous grayish-white spots or streaks, sometimes as large as a kernel of wheat, consisting of a mass of micrococci surrounded by leucocytes; each of these results in a small abscess, with degeneration or destruction of the adjacent muscular fibres. These abscesses may be quite numerous; they are oftenest seen on the anterior wall of the left ventricle, near the apex. Incidentally there may occur rupture of the abscess into the pericardial sac, giving rise to suppurative pericarditis, or rupture into the cavity of the heart, causing malignant endocarditis and general septicæmia; or if the septum is the seat of suppurative processes, extensive perforation of the septum may occur; or there may be aneurismal dilatation at the seat of the abscess, resulting in rupture of the heart or, if within the septum ventriculorum, a rupture into either ventricle. The termination is almost surely fatal. Exceptionally encapsulation may take place, with inspissation of the contents and the formation of calcareous bodies.

The symptoms of the cardiac lesion are vague, for they are largely covered by those of the primary disease. More or less dyspnœa, some pain, cough and a sense of weakness of the heart are usually present. The action of the heart is rapid, with paroxysms of great acceleration of the heart-beat, sometimes as high as two hundred to the minute. In diseases liable to give rise to myocarditis, the sudden appearance of arrhythmia, or of an aggravation of the fever, possibly assuming a septic type, indicate the accession of this complication. Sudden dilatation of the heart or embolisms are recognized without

much difficulty from the character of the symptoms to which they give rise.

The physical signs are those of weak heart, dilatation, or valvular involvement.

The diagnosis is uncertain, and the prognosis grave in all but light cases of the diffuse form. Death may result with startling suddenness in the infectious fevers, especially in diphtheria; on the other hand, recovery may take place even in the suppurative form, as demonstrated by the occasional presence, *post-mortem*, of encapsulated calcareous masses in the substance of the heart muscle.

Treatment.—The most important item is absolute rest, which must be maintained throughout and is not to be broken under any circumstances, since even a very moderate effort on part of the patient may be followed by fatal collapse. It is on this account that all the wants of the patient, including feeding and attention to the calls of nature, must either be met while he is in the recumbent position or in such a manner that it precludes the slightest exertion on his part; he must not even be allowed to turn from one side to the other without assistance. The diet must be nourishing and easily digested. Milk answers every purpose, and is best taken diluted with Vichy water. If a more generous diet is demanded, fish, the white meat of fowl, or a very tender, carefully broiled small piece of steak may be added. Fruit, ripe and taken in moderate amounts, is unobjectionable. If there is much præcordial distress, cold applications may prove a source of relief. Alcoholic stimulants, if given at all, must be used with great care.

Therapeutics.—Of remedies, those capable of exerting a beneficial effect in pericardial and endocardial inflammation are indicated, and these chapters must be consulted. ACONITE and VERATRUM, when exhibited, must not be used in the lower attenuations or mother tincture, lest they aggravate the condition they are expected to relieve. "Heart-tonics," especially DIGITALIS, must be avoided; they increase the danger of rupture of the heart in case of suppuration; if prescribed at all, they must be administered in minute doses. ARSENICUM, PHOSPHORUS, LACHESIS, CROTALUS, and other remedies of this class, must be carefully studied in serious cases. The heart-symptoms alone will rarely furnish the key to the remedy; it lies in the totality of symptoms.

CHRONIC MYOCARDITIS.

Chronic myocarditis or "fibroid" heart is an inflammatory affection of the interstitial connective tissue of the heart, associated with hyperplasia, and leading to induration of its substance.

Ætiology.—The most prolific cause of fibrous heart is disease of the coronary arteries, resulting in insufficiency of the blood supply to the heart, giving rise to anæmic necrosis or, in case of extensive stoppage of the circulation, as by obliteration of one of the coronary arteries, to the formation of large areas of sclerosis. The element of disturbed nutrition of the heart is an important one, and is chiefly responsible for the occurrence of chronic myocarditis in many cases of valvular disease. Sometimes the affection follows diffuse acute myelitis, especially when this disease depends upon acute articular rheumatism; exceptionally it arises from infection by the bacillus tuberculosis or the virus of syphilis. The preponderance of coronary disease in men past middle age and the general tendency of advanced years to sclerotic changes accounts for the more frequent occurrence of the affection in men at that period of life.

Morbid Anatomy.—The essential feature consists of overgrowth of interfibrillar connective tissue, with development of fibrous tissue, which encroaches upon the muscular structure, leading to atrophy and degeneration of the latter; in some cases the atrophy of the muscular fibres is extreme. These changes may be limited to a small area, as when due to anæmic sclerosis depending upon general innutrition of the heart from general disease. They are oftenest seen in the left ventricle, papillary muscles, and septum of the heart. The heart itself is increased in size and weight; dilatation occurs in advanced cases, and is most marked when there is adherent pericardium. The heart wall is firm and resistant to the knife, in places almost cartilaginous. Thickening of the endocardium is frequent. The coronary arteries present sclerotic changes and the terminal branches are narrowed, sometimes occluded. Obliterative endocarditis occurs oftenest in syphilitic subjects. With increasing weakness of the heart distant organs undergo changes such as are found in advanced valvular disease.

Aneurism of the heart results from localized sclerosis; saccular dilatation may take place from the giving way of the inelastic fibrous tissue before the intracardial pressure.

Symptoms.—The beneficent effect of compensatory hypertrophy is responsible for the frequency with which during life appreciable disturbances of health are wholly wanting and the existence of serious heart trouble is not even suspected. When symptoms appear, they are simply those of a failing heart and present nothing diagnostic of the type of the affection. There is palpitation and irregular action of the heart, more or less dyspnoea from exertion, and constriction and uneasiness at the heart. Exceptionally paroxysms of angina pectoris occur. The pulse is usually decreased in frequency; it may be regular, but is more likely to be intermittent and unequal. In more advanced cases there may be profound syncope from any mental excitement or physical exertion, even resembling apopleptic seizures. As dilatation takes place, the symptoms assume the character peculiar to that condition. Cerebral anæmia is pronounced in many cases.

The physical signs are indefinite.

The diagnosis under these circumstances cannot often be positive. It depends upon the existence of a demonstrable cause and of progressive cardiac weakness, dilatation, cerebral anæmia, abnormality of the pulse, ready loss of the heart's balance from any sudden exertion, confusion of ideas and syncope. The cases which are easiest recognized are those generally known as "senile heart."

The prognosis is decidedly unfavorable so far as recovery is concerned, but hopeful as to duration of life, provided due care is exercised not to tax the heart severely, especially by violent physical exertion. Sudden death may occur from syncope or angina pectoris.

Treatment.—Generally speaking the treatment is that of hypertrophy and dilatation, with particular reference to the first cause. While the patient is still able to be about, every means within reach should be utilized to invigorate the heart, and to this end nothing is more effective than a quiet life in the open air, with enough exercise to act as a mild tonic without producing excessive weariness, dyspnoea or cardiac pain. The value of this measure cannot be overestimated, and if the

patient's means allow it, he may indefinitely prolong life and reasonably good health by living where these advantages can be enjoyed. It is evident that a low altitude, even the sea-level, is a necessity; but lovers of mountain scenery may console themselves in the knowledge that under favorable conditions the heart may be toned up sufficiently to endure quite an elevation, provided good judgment is exercised in daily habits and employment. The sea-coast of Southern California, with its freedom from great heat in the summer and severe cold in the winter, offers unequalled inducements to such cases.

As to daily life, freedom from excitement, abstinence from coffee, tea, alcoholic stimulants and tobacco, with regular and moderate exercise are necessary; a rapid cold bath, followed by brisk rubbing, may be taken every second day. Cardiac stimulants may be required; of these strychnia is here especially valuable. The precautions necessary in the use of digitalis were pointed out elsewhere (see Valvular Diseases). Strophanthus and sparteine frequently are useful; the latter may be given hypodermically, in doses of $\frac{1}{8}$ to $\frac{1}{4}$ of a grain several times daily. Nitro-glycerine, amyl nitrite, and other drugs of use in valvular disease, are employed as indicated. In case of syncope the clothing about the neck must be loosened, the head lowered, ammonia be held under the nose, and hot whiskey given internally. Threatening collapse is met by subcutaneous injections of camphor (camphor one part; ether ten parts, a syringe full every fifteen or twenty minutes; Whittaker) or sodium benzoate in five-grain doses by the mouth or three-grain doses hypodermically.

DEGENERATIONS OF THE MYOCARDIUM.

Parenchymatous Degeneration.—This disease, formerly considered a parenchymatous myocarditis, consists of a degeneration of the muscular fibres, which are more or less densely infiltrated with granules that resist the action of ether, but are soluble in acetic acid and dilute solutions of caustic potash. The myocardium becomes pale, turbid, and soft. The affection is oftener seen in the left heart, but may affect any part of the organ. It occurs usually in fevers (especially diphtheria, typhoid fever, scarlet fever), but no definite relation seems to

exist between it and the high temperature characterizing them. The symptoms are those of diffuse myelitis.

Fatty Heart.—Two forms are recognized: (a) fatty infiltration or overgrowth and (b) fatty degeneration.

(a) *Fatty Overgrowth (cor adiposum)* is found more than twice as often in men as in women, and fully eighty per cent. of the cases occur between forty and seventy years of age. The condition consists of an excess of sub-pericardial fat, enveloping the entire heart in a layer of fat which may reach the thickness of one-half inch, or in an infiltration of fat into the muscular fibre, separating the muscular strands, penetrating even as deep as the endocardium, especially in the right ventricle, and impairing the contractile power of the heart. The muscular fibres become atrophied (simple or brown atrophy), or are filled with albuminous granules or drops of oil, or show traces of fatty degeneration. There is usually relaxation of the heart and dilatation of the chambers. The symptoms are those of cardiac weakness, with a pulse which usually, but not always, is rapid and weak. Fatty infiltration may result in rupture of the heart.

(b) *Fatty Degeneration.*—Fatty degeneration of the heart is in reality a part process of myocarditis. It is oftenest seen in men of advanced years, and very largely depends upon failing nutrition. The immense amount of work done by the heart muscle requires perfect nutrition; interference with its nutrition is followed by serious results; hence the proneness of the heart to degeneration, which is especially marked in those parts of the heart muscle which do the larger amount of work. The ætiology then embraces constitutional states marked by loss of vitality and impaired nutrition, as: old age, profound anæmia, wasting diseases, cachexia, great loss of blood, acute infectious diseases, and poisoning by phosphorus, arsenic, and alcohol; it also includes certain local diseases, especially pericarditis, coronary disease and, to a limited extent, ventricular hypertrophy in valvular affections.

Morbid Anatomy.—The heart is large, flabby, tears easily, and is of yellow-brown color. The fatty degeneration usually occurs in masses and becomes diffuse by dissemination and coalescence, with spots of the most intense degeneration; striation does not essentially suffer; segmentation occurs often.

Fatty degeneration seldom stands in direct relation to the dilatation and hypertrophy of individual sections of the heart, for when one chamber only is hypertrophied both sides may show fatty degeneration; when resulting from toxic action, the fatty degeneration is rarely uniform, but is especially marked in certain circumscribed areas; the layers under the epi- and endocardium show the most pronounced fatty degeneration (Gœbel). The microscope proves that in the early stage rows of minute globules are arranged along the line of the primitive fibres; in the advanced stage the fibres are completely occupied by them.

Symptoms.—Fatty degeneration often is latent. When there is disturbance of health, the symptoms are those of weak, failing heart. Very often the heart does its work with perfect regularity in spite of extensive degeneration; in fact, it is only when dilatation has begun that the condition arouses attention. Dyspnœa, pain at the heart, often paroxysms of angina pectoris, "bad spells," with asthma from exertion or overeating, attacks of syncope, slow pulse and similar disturbances show themselves. There is much mental and physical depression. The skin is often pallid, almost waxy, especially under the eyes and about the nose; there may be a segment of discoloration in the upper zone of the cornea (*arcus senilis*), but this is no longer considered characteristic. Sometimes there is great emaciation. Mental symptoms may be pronounced, the patient suffering from delusions or even mania. Cheyne-Stokes breathing is frequently seen in the late stage. Congestion of inner organs and œdema are not so frequent or marked as in valvular disease.

The physical signs are indistinct, and the diagnosis is practically limited to the recognition of heart failure, with mere inference as to its specific cause.

The prognosis depends upon the extent and rapidity of the degenerative changes, and, in the main, is decidedly unfavorable.

The treatment in well established cases consists of absolute bodily and mental rest and of a diet which is nourishing and easily assimilated, and from which sugar and starch are rigidly excluded. The dietetic rules practiced in the treatment of obesity must be observed. Overeating is to be scrupulously

avoided. Heart stimulants must be used with caution, especially digitalis in any but very light doses, and all the rules applicable to the treatment of cardiac dilatation are to be observed. In case of sudden heart failure the diffusible stimulants (ether, ammonia, alcohol) are indicated; amyl nitrite and nitro-glycerine may be demanded (arterio-sclerosis). Paroxysms of severe pain at the heart or angina are to be met with hot applications over the heart, alcoholic stimulants in hot water or milk, nitro-glycerine or amyl nitrite; morphia must not be used save as it is unavoidable, and then with great care.

Other forms of degeneration of the heart are: amyloid degeneration, hyaline transformation of Zenker, and calcareous degeneration. They are infrequent and of slight practical importance.—Osler in substance gives the following excellent summary of myocardial disease: (1) Cases in which sudden death occurs with or without previous indications of heart-trouble. These cover sclerosis of the coronary arteries, extensive fibroid disease, and fatty degeneration. Many patients never complain of cardiac distress, but enjoy unusual vigor of mind and body. (2) Cases in which there are cardiac arrhythmia, shortness of breath on exertion, attacks of cardiac asthma, sometimes of angina, symptoms of collapse, with sweats and extremely slow pulse, and occasionally marked mental symptoms. In these cases the condition may be strongly suspected and, in some instances, diagnosed. A distinction between the fatty and fibroid heart is rarely possible. (3) Cases in which there are cardiac insufficiency and symptoms of dilatation. Dropsy is often present, and with a loud murmur at the apex it may be difficult, unless the case has been seen from the outset, to determine whether or not a valvular lesion is present.

ANEURISM OF THE HEART.

Aneurism of the wall of the heart is a rare condition, always the result of weakness of the tissue texture of the heart which eventually renders it unable to resist the pressure of the blood within. The outward pressure of the blood forces the formation of a depression on the inner surface of the heart at the point

of greatest weakness, and finally creates a sac or pouch which communicates with the heart freely or by a constricted opening. Aneurism is acute or chronic, according to the nature of the disease which is responsible for the textural change causing the aneurism. Such changes occur in inflammatory conditions of the substance of the heart and of the endocardium, in fibrous changes of the heart, in fatty degeneration, and in the softening of the heart accompanying syphilitic and tuberculous disease. The condition is most frequently seen at the left ventricle, near the apex, and appears to occur oftener in men than in women. The size of the tumor varies; it may rival the heart itself. The contents of the sac are usually blood clots or layers of fibrin, of which the outer layers may be organized and adherent to the heart-wall.

The symptoms are vague, merely indicative of disease of the heart.

Of physical signs, a bulging in the region of the apex may be visible if the aneurism is very large, or there may be a marked disproportion between the strong impulse of the heart and the feeble pulsation in the peripheral arteries. The duration of life under such circumstances is wholly problematical, and depends altogether upon the condition of the heart which gave rise to the occurrence of this accident.

Treatment is limited to alleviating measures.

Aneurism may occur in a valve, from similar causes, usually an acute endocarditis. The mechanism is the same as in aneurism of the wall. The entire thickness of the valve may be dilated and form a pouch, or a sac may be formed by destruction of one of the lamellæ. Valvular aneurisms rupture soon and cause perforation and insufficiency of the affected valve.

RUPTURE OF THE HEART.

Rupture of the heart occurs in diseases of the heart muscle, especially in fatty degeneration, more readily when localized; also in acute softening which results from embolism of a branch of the coronary artery, from suppurative endocarditis, and from syphilitic gummata. The immediate cause is oftenest a strain. Rupture generally occurs in the left ventricle (anterior wall), rarely in the right ventricle, still more rarely in the

auricles. The tear is usually parallel with the septum; the blood is emptied into the pericardial, sometimes into the pleural, cavity.

The symptoms are: sudden onset of intense, agonizing pain in the region of the heart, with sense of overwhelming suffocation, loss of consciousness, and death. Quain states that sudden death occurred in 71 per cent. of his cases. If death does not occur for several hours, the intense anguish may grow less and the patient may recover consciousness; but there is profound collapse, with great dyspnoea, cold sweat, coldness of the body, nausea and vomiting, fainting; the action of the heart is usually bounding and tumultuous. If the rupture is partial, the patient may live for several days. Death occurs from shock and sudden paralysis.

The diagnosis is very difficult, and the prognosis hopeless.

Treatment is limited to the application of cold (ice bags) over the heart, the enforcing of complete rest, and the relief of pain by such measures as suggest themselves. Sinapisms to the extremities are recommended for the purpose of drawing the blood from the heart, but they are of slight value. Diffusible stimulants may be required to mitigate the effects of the shock. Rupture of the heart from wounds belongs exclusively to the domain of Surgery.

TUMORS OF THE HEART.

Tumors of the heart are rare. *Carcinoma* is almost always secondary. It may involve any part of the heart and multiple deposits of a cancerous character may be found throughout the heart substance. It usually results from extension by contiguity or continuity of structure. *Sarcoma* is even more rare; it is usually seen in the young, and is characterized by rapidity of growth. The left side of the heart is generally affected. *Myxoma* have been found in nine cases, and always in the left auricle, "forming nodular tumors of transparent gelatinous consistence, attached by a thin pedicle to the wall." In all the cases the patients had suffered from apoplectiform attacks. The existence of *fibroma* has been reported by several observers. In one case there was infarction of the spleen and kidneys; in another, involving the substance of the heart wall, the

symptoms were remarkable smallness of the pulse and paralytic seizure; in a case of fibrinous cyst in the left auricle there was rupture, apoplexy, typhoid symptoms, and death. Cysts in the heart are rare; they are filled with a clear or brownish fluid, sometimes with blood.

NEUROSES OF THE HEART.

PALPITATION.

“Palpitation of the heart may be defined as a beating of the heart which is felt and which disturbs the patient. Whatever the cause, all palpitations have the common character that the patient feels his heart beat.” (Lænnec.) A physiological increase in the rapidity or force of the heart beat, as from an exertion, is not palpitation; the subjective sensation that the heart’s action is disturbed is the essential feature.

Ætiology.—Palpitation, as here considered, is essentially an expression of disturbance or increased excitability of the nervous system; it is, therefore, frequently found in connection with hysteria or neurasthenia, and under conditions and at periods of life when such states are most liable to occur. People of sedentary life and luxurious habits, who practice all sorts of self-indulgence, furnish a large per cent. of neurotics and of palpitation; the laboring man whose life is spent in hard toil and whose habits are regular is practically exempt. Whenever hysteria and neurasthenia are characterized by some form of indigestion, palpitation is almost sure to be an annoying element of the case. Women are particularly subject to it at puberty, at the climacteric period, and frequently during menstruation. Emotions, especially fright, are exciting causes, and in persons subject to palpitation so trifling a matter as the unexpected entrance of a stranger, or even of an acquaintance, or the necessity of submitting to an examination of the heart, possibly for life insurance, may bring on a violent attack of palpitation; stage-fright often assumes this form. The ease with which in proper subjects the heart may be completely upset is astonishing. I know of a case in which the conscious-

ness of being closely observed is in itself quite sufficient to cause distressing palpitation. Other factors are: tea, coffee, tobacco, alcohol, indigestion. Palpitation also occurs during and after recovery from exhausting illness, as from acute fevers, in connection with various affections of the heart, especially myocardial and valvular disease, and not infrequently, in my experience, as an aura in epilepsy. I have under observation a patient in whom a violent attack of palpitation has taken the place of an epileptic seizure.

Symptoms.—Palpitation occurs in paroxysms of subjectively recognized tumultuous action of the heart, often excited by trifling causes or even a mere apprehension. Patients complain of a variety of sensations referable to the heart, a choking sensation or distressing fulness at the heart, a sensation as if the heart were jumping into the throat, as though it were rolling over, as though it were “unhinged,” as though it would stop beating. There is always associated with it a sense of great danger, which cannot be overcome by the patient’s positive knowledge that such danger does not exist. Hence, the countenance may be cold, the forehead covered with sweat, and the expression of the face one of great apprehension and profound alarm. Often there are visible pulsations against the chest wall, much dyspnoea, and a rapid, full pulse, sometimes reaching 150 beats in the minute. The attack may cease abruptly; oftener it disappears gradually; usually it leaves the patient much exhausted. The duration varies from a few minutes to an hour, or more. Copious emissions of pale, limpid urine after the attack has ceased are common, especially in hysterical subjects. Recurrences after a brief interval are not infrequent, and several days may pass before the heart resumes a state of normal tranquility. It is said that in some patients threatening attacks may be aborted by a severe physical exertion. The physical signs are vague; if arising from organic disease of the heart, the signs belonging to such a state are, of course, present. The prognosis is good, save in the presence of organic cardiac disease.

TACHYCARDIA—RAPID HEART.

Making due allowance for the fact that in some persons the action of the heart is remarkably rapid through life, and that

often a sudden rise in the heart's rapidity is to all intents and purposes purely a physiological process, there are other cases of rapid heart which are undoubtedly pathological. These often appear closely related to palpitation, both as to causation, symptomatology and treatment; but differentiation is easy when it is remembered that in palpitation the subjective sensation of cardiac disturbance is the essential feature. The exhaustive arrangement of the causes of tachycardia made by Larcena is about as follows: (1) Diseases of the heart and blood-vessels (overstrain, hypertrophy of growth, myocarditis, acute endocarditis, valvular disease, pericarditis, angina pectoris, aortitis, arterio-sclerosis, cardiac affections from Bright's disease). (2) Febrile conditions. (3) Compression of the vagus, either trunk or nucleus. (4) Organic disease of the nervous system (bulbar disease, softening in the medulla, medullary affections, acute ascending paralysis, acute myelitis, progressive muscular disseminated sclerosis, multiple sclerosis of the pyramids without lesion of the anterior horns, tabes dorsalis, syringo-myelia, degeneration of the vagus in tabes dorsalis, polyneuritis, beri-beri). (5) General diseases, as typhoid fever, diphtheria, tuberculosis, carcinoma, chlorosis, syphilis, chronic malaria, chronic articular rheumatism, including convalescence and exhaustion from disease. (6) Toxic action of alcohol, coffee, tea and drugs (digitalis, atropine). (7) Reflex from disease of the heart, brain, lungs, stomach, liver, intestine, abdomen, uterus, bladder, prostate gland, brachial plexus. (8) Neuroses: Graves' disease, hysteria, epilepsy and neurasthenia.

Paroxysmal tachycardia appears to be of purely neurotic origin, the patient evidently enjoying good health, save suddenly appearing paroxysms of increased action of the heart, the pulse reaching 200, or more. The immediate cause is in doubt. H. C. Wood thinks that the trouble lies in the centres of the accelerator nerves. Osler quotes Franck, who has shown that the acceleration of the heart's action is due to shortening of the diastole, and that during the systole the amount of blood expelled is so small that there is actually no increase in the amount of blood expelled in the minute. During the attack there may be felt some dizziness, and often, as in palpitation, a feeling of apprehension. The radial pulse is almost threadlike, and the heart impulse to the hand or ear scarcely perceptible,

resembling more a "vibratory" effort than a series of distinct beats. The first and second sounds are equal and there is no pause, the heart-beat resembling the ticking of a watch and the foetal heart-beat. The attack usually lasts for a few minutes, sometimes for a half hour, or more. There may be frequent recurrences for several days, and in such cases the rapidity of the heart may be increased to 200 and 300 (Whitaker).

The diagnosis is easy; the regularity of the heart-beat is important in differentiating it from the rapid heart of cardiac dilatation.

The prognosis is good, so far as recovery from the individual paroxysm is concerned; it is, however, evident that frequent recurrence of such intense activity must eventually destroy the heart. When associated with organic brain disease, the prognosis is necessarily serious.

Treatment of Palpitation and Tachycardia.—It is of the greatest importance to ascertain the cause and then remove it, if possible. Conditions of nervous irritability from weakness may often be wholly eradicated, and with it the tendency to palpitation; the same applies to indigestion. Each and every measure tending toward the establishment of good general health must be utilized, including a normal life, regular habits, regulated exercise, steady and agreeable employment, an abundance of sleep, etc., always with especial reference to the requirements of each case. Tobacco, coffee, alcoholic stimulants and any other agents which unfavorably affect the nervous system and the heart are to be prohibited. Attention to the details of the patient's diet, as the exclusion of starchy foods, is often followed by gratifying results. During an attack of palpitation the patient must be placed in a semi-recumbent position, the clothing about the throat and chest loosened, and an abundance of fresh air admitted. If the action of the heart is very tumultuous, ice-bags or cloths wrung out of ice water, applied over the heart, often prove very beneficial. If there is pain at the heart, mustard draughts may afford relief. Aromatic spirits of ammonia, in doses of 20 or 30 drops, or camphor in full doses, or a tablespoonful of brandy in hot water, may be beneficial. Usually the exhibition of the indicated remedy controls the attack in a reasonable length of time, and

- tends strongly to prevent its recurrence. Heart tonics, especially strychnia, are of service after the attack has passed. Galvanism, applied daily, not more than five minutes, and of moderate strength, has yielded excellent results; the positive pole is applied to the vagus at the inner surface of the sternomastoid, with the negative pole at the lower border of the sternum.

The same general directions apply with equal force to the treatment of "rapid heart." The paroxysms, however, are much more difficult to manage. Ice-bags or cold compresses over the heart, AMYL NITRITE, sometimes NITROGLYCERINE or DIGITALIS, the latter in organic disease, are indicated, but only too often prove of slight service. Nothnagel, Rosenfeld, and others, advise compression or irritation of the vagus. Rosenfeld, in the report of a case, describes the details of the treatment as follows: The patient, a lady, laid herself horizontally in bed, raised the head a little, and pushed the feet against the bed. She then made a deep inspiration and pressed the lungs down with all her power by forcible closure of the glottis. The diaphragm was likewise fixed by energetic action of the abdominal walls; the arms were bent at the elbow and pressed upon the chest and sides of the thorax, while contraction of the pectoral muscles drew the chest backward. Thus the contents of the thorax were fixed in every direction, from above, from below, and from the sides, for fifteen or twenty, or more, seconds. The immediate effect of this pressure was an increase in the pause of the heart, a momentary standstill, followed by two or three strong and slow pulsations, and the attack was ended. During pressure the face becomes bluish, the eyes are prominent, the lips and nose are cyanotic. But as soon as the pulse becomes normal, the usual color of the face returns. (Whittaker in Twentieth Century Practice.) H. C. Wood relates a remarkable case of paroxysmal tachycardia in which the attack could always be aborted by drinking a glassful of very cold ice-water.

Therapeutics.—If from *hysteria*: AMBRAGRISEA, ASA FŒTIDA, CAMPHORA, CROCUS, IGNATIA, NUX MOSCHATA, PULSATILLA, SCUTELLARIA, SUMBUL, VALERIANA. From *mental excitement*: ACONITE, CAMPHOR BROM., NITRIC ACID, NUX VOM., OPIUM, SCUTELLARIA, VALERIANA. From *fright*: ACONITE. From *ex-*

cessive joy: COFFEA. From *grief*: IGNATIA, PULSATILLA. From *anæmia*: CALC. CARB., CHINA, CUPRUM, FERRUM, HELONIAS, IGNATIA, NATRUM MURIAT. From *excessive physical exercise*: ACONITE, COCA. Sensation of *trembling* about the heart: CAMPHOR, DIGITALIS, KALMIA, LILIUM TIGR., NATRUM MUR., SPIGELIA, SUMBUL.

ACONITE. After fright or violent physical exercise; in young and full-blooded persons; with great oppression at the heart and tendency to syncope; worse from every motion; full, hard pulse; fear of death.—AMBRA GRISEA. In anæmic, exhausted, overworked, nervous subjects, suffering from nervous irritability and insomnia, with pressure and uneasiness in the chest; he worries about the heart, fancies he feels it beat all through the body. Not so useful in violent attacks of palpitation as in the constant fretting about heart-trouble in pale, exhausted, nervous subjects.—ASA FŒTIDA. In hysterical women who are very sensitive to external impressions and who are subject to flatulency. The heart appears unhinged, flutters, beats rapidly, irregularly and feebly; everything unexpected, no matter how trifling, upsets the heart. Flushing of the face; anxiety and restlessness, rather vague, but tormenting. At times intense and even painful pressure about the heart, evidently from gastric flatulency and relieved from the eructations of gas.—AMYL NITRITE. Tumultuous action of the heart, with præcordial anxiety, great oppression, sense of constriction about the heart, extending into the throat; fluttering of the heart from slightest motion.—AURUM. Hypertrophy; fatty heart; palpitation brought on from even slight exertion, especially going up a hill; feels as though the heart-beat were excessively powerful and would burst the chest from the pressure within. Must be active at some employment, cannot keep still. Sexual irregularity. Great mental depression; worries constantly and threatens to commit suicide. Especially adapted to young people of scrofulous diathesis, suffering from the results of sexual vices, as excessive masturbation.—BELLADONNA. Chiefly indicated by actual congestion, rush of blood, great pressure about the heart, with anxiety and distress, headache, etc. Useful in some cases of palpitation in young women when, with this congested state, there is an explosive violent restlessness, as though she would actually fly to pieces; she is vio-

lently hysterical, her eyes flash, she screams, strikes, bites, is determined to get away from those who take care of her; in such cases she complains of pressure as though the heart would burst and as though she must tear it out of her body.—**CACTUS** has violent palpitation, with constrictive, band-like or vise-like pressure at the heart, and, like **BELLADONNA**, sense of great fulness; but it lacks the violence and intensity of both cardiac and mental symptoms of **BELLADONNA**. Palpitation brought on from mental emotion, with fluttering sensations about the heart. Useful when there is cardiac hypertrophy. It acts upon the heart muscle, and is of more value as a regulator of the muscular apparatus than in nervous affections.—**CAMPHOR** (camphor monobromate) is of service chiefly through its physiological effect upon the nervous system and its usefulness in hysteria. It is a powerful heart stimulant, but clinically it must be valued as an antispasmodic. The monobromate of camphor has been extensively used in hysteria, usually in five-grain doses, in form of sugar-coated pills or in capsules; it is apt to irritate the stomach. Lilienthal, Clarke, and others advise its use (attenuated?) when there is palpitation with a full or weak, imperceptible pulse, coldness of the surface and collapse, "especially if there is at the same time intolerance of external heat" (Clarke).—**CANNABIS INDICA**. Hysteria, with mental exaltation bordering upon delirium; awakened from sleep by palpitation, with much oppression at the heart and dyspnoea; fulness and great oppression at the heart, so he wants to be fanned constantly. "Sensation as if drops of water were falling from the heart" (**CANN. SAT.**).—**COCA** is a valuable general tonic. It is highly recommended in cases of palpitation from overexertion, especially in mountain climbing. It should be given in physiological doses.—**COFFEA**. Exceedingly valuable in palpitation brought on by mental excitement, with general nervous erethism. Great sensitiveness and excitability; trembling of limbs; sleeplessness. Occasionally, when of unmistakably nervous origin, a cup of black coffee quickly relieves. The attenuations usually act well.—**CROCUS** has palpitation, with anxiety at the heart, with weakness extending through the whole body to the soles, as if the body were sinking down (T. F. Allen), with warmth about the heart, emptiness in the præcordial region, etc. It has been pre-

scribed for the palpitation of hysteria, with a sensation as though some living thing were jumping about in various parts of the body; its mental condition is striking; the mood is changeable; he scolds, but repents the next moment; uncontrollable laughter.—*GLONOINE* is indicated by throbbing, bursting fulness of the heart's action, with throbbing fulness in the head, great oppression and anxiety; purring noise in the cardiac region when lying down; pulse intermittent.—*IGNATIA* is rarely of any use during the attack, but not infrequently proves of great service in curing the primary trouble. The characteristic mental condition, faintness and goneness at the stomach and gastric disturbances with flatulency are reliable indications for its use.—*LACHESIS*. Intolerance of constriction anywhere and of touch; trembling and fluttering of the heart; sense of suffocation; very irregular action of the heart; feeling as if the heart turned over.—*MOSCHUS*. Palpitation with much anxiety, apprehension of death, nervous chilliness, fainting from the slightest cause. In hysterical persons. Palpitation of tobacco smokers (?).—*NUX MOSCHATA*. Hysteria; long intermission of the pulse-beat; it seems as though the heart had stopped "for good." Awful, death-like feeling about the heart; fluttering and trembling, as if from fright; faintness and fainting.—*NUX VOMICA*. Frequent and short spells of palpitation in dyspeptics of sedentary habits, from mental emotion, and with the characteristics of the remedy.—*PULSATILLA*. Useful in the treatment of the primary disease rather than of the paroxysm. Characteristic disposition; palpitation of moderate degree, but with tendency to their recurrence, in young girls at puberty or with amenorrhœa; relieved by pressure with the hands; chilliness; occasional sharp, rheumatic pain at the heart; sense of suffocation.—*SEPIA*. An important remedy for the cause of the primary disease; especially useful in women who suffer from derangements in the sexual sphere which are covered by *SEPIA*. Tremulous feeling in the heart, with flushing. Worries about trifles, often about things that happened long ago and cannot be helped.—*SCUTELLARIA*. From emotional excitement; hysteria of women suffering from uterine and ovarian disorder. Sensation of throbbing or trembling about the heart; sticking pain in the heart.—*SPIGELIA* may be demanded, exceptionally, by severe

sticking or neuralgic pain about the heart, with irregular and tumultuous action.—*VERATRUM ALBUM* and *VERATRUM VIRIDE*. The heart is utterly exhausted from long-continued effort; symptoms of collapse; skin cold and clammy; pulse intermittent, slow. Consult also *CALCAREA*, *CHINA*, *CONIUM*, *KALI CARB.*, *KALMIA*, *PHOSPHORUS*, *PHOSPHORIC ACID*, *TABACUM*, *THEA*.

ARRHYTHMIA.

Irregularity in the heart's action arises from variations in the force of successive beats or from irregularity in the intervals between the beats. To a certain extent this condition is not incompatible with health, and cases are on record of marked arrhythmia persisting for a long term of years. Baumgarten classifies the causes as follows: Central (cerebral), either organic (as in hæmorrhage or concussion) or psychical influences. Reflex, as illustrated in irregular action of the heart in dyspepsia or diseases of the lungs, liver, or kidneys. Toxic influences, as tobacco, tea, coffee, digitalis, belladonna, and other drugs. Changes in the heart itself, either in the cardiac ganglia or in the substance of the heart; the latter are usually characterized by dilatation, fatty degeneration, and sclerosis of the coronary arteries. Various forms are recognized, as: the *pulsus paradoxicus* (Kuessmaul), in which, through weakness of the heart, the blood is not propelled with sufficient force through the thoracic blood vessels; hence an interruption of the pulse during full inspiration, reappearing during the expiration. It is found with compression of the aorta by pericardial adhesions.—*Pulsus intermittens*. The rhythm is broken by the absence of one or more beats.—*Pulsus alternans*. Strong and weak pulsations alternate regularly.—*Pulsus bigeminus*. An irregular pulse with a slight pause after every second pulsation.—*Pulsus trigeminus*, *p. quadrigeminus*, *p. quinquegeminus*. Irregular pulse with a slight pause after every third, fourth or fifth pulsation.—*Pulsus dicrotus*. The finger feels two distinct blows, one lighter than the other, for each cardiac systole, the result of rapid pulsation of the heart and diminished arterial tension; the artery rebounds with each contraction of the heart, in addition to the original impulse.—*Water*

hammer pulse (Corrigan's). "A jerking, visible, collapsing, tortuous and yet regular and rapid pulse, characteristic of aortic incompetence with hypertrophy of the left ventricle or aneurism of the ascending transverse portion of the arch of the aorta, and of disease of the aorta when that vessel has become rigid and dilated."—*Embryocardia. Fœtal heart rhythm* (Stokes). The character of both heart sounds is alike, and the long pause between them is shortened.—*Gallop-rhythm*, sounding like the foot-fall of a horse at a canter, from reduplication of the second sound of a rapidly beating heart. It is heard often in arterio-sclerosis and interstitial nephritis.—*Delirium cordis*. Wholly irregular, tumultuous action of the heart, usually found in the late stage of cardiac dilatation associated with valvular lesions.

BRADYCARDIA.

Bradycardia, brachycardia, or "slow pulse" may be the normal pulse of some persons, the term usually being made to cover a pulse of less than 60 or 50 beats to the minute. It may be physiological or pathological. Physiologically it is characteristic of the puerperal state and of hunger. Pathologically it is found in convalescence from acute fevers, probably the result of exhaustion; in diseases of the digestive system (dyspepsia, ulcer and cancer of the stomach), of the respiratory system (oftener emphysema), of the circulatory system (fatty and fibroid changes in the heart), of the urinary system (occasionally in nephritis and uræmia), as the result of poisoning (lead, tobacco, coffee, digitalis, alcohol); in anæmia, chlorosis, diabetes; in diseases of the brain (apoplexy, epilepsy, hydrocephalus, medullary disease, cerebral tumors, injuries to the cervical vertebræ, etc.) and nervous system (chronic disease of the spinal cord, myelitis, pachymeningitis, cerebro-spinal meningitis); persons suffering from epilepsy or dementia paralytica frequently have an abnormally slow pulse.

Bradycardia, when associated, as it is in the majority of cases, with serious forms of disease, must necessarily be looked upon with apprehension. If also arrhythmic and weak, it becomes doubly serious. In organic disease of the heart, as in insufficiency of the aortic valves and in mitral insufficiency, the

prognosis is very grave. The same seriousness attaches to it in diseases of the brain.

ANGINA PECTORIS.

Angina pectoris, stenocardia, sternalgia, breast-pang, is a symptom which usually occurs in connection with organic disease of the heart and vessels (coronary disease and sclerosis at the root of the aorta) or of a neuralgic character, consisting of an intense, agonizing pain at the heart, frequently extending upward into the left shoulder and neck or downward into the left arm, associated with a sensation of impending death. Two forms are distinguished: true angina, associated with the organic changes indicated, and false angina (pseudo-angina), neurotic or neuralgic in character. The affection is rare. True angina is usually seen in men past fifty years of age; pseudo-angina occurs oftener in women, occasionally in children, and is frequently associated with other neuroses (hysteria, hypochondriasis, epilepsy); it is often brought on by great physical exertion or violent emotional disturbances. A form of angina, the result of exposure to cold, has been described by Nothnagel.

Ætiology.—The ætiology of angina pectoris is still unsettled so far as this embraces exact knowledge of its pathology. For practical purposes it is sufficient to bear in mind that in true angina obstruction of the coronary arteries appears always to be present, and that this condition directly affects the nutrition of the heart; whether the pain is due to anæmia or to necrotic processes set up in the heart muscle is still an open question. In either case motor weakness exists, and it is not difficult to understand that under such conditions any special exertion or powerful emotional excitement may readily cause intense pain. The irradiations of pain are explained by the relation of the cardiac plexus to other nerves, and the preponderance of these irradiations on the left side is held due to the fact that the aorta and heart lie on the left side or that the attacks may emanate from the left heart. The brain comprehends and appreciates threatening danger, thus giving rise to the distressing sensation of impending death, even though the pain, as in some cases, may not be excessive. Pseudo-angina depends upon hysteria and other neuroses, from reflex causes

(as dyspepsia or other disease of stomach or intestines), from the presence of tumors in the neck or chest, aneurism, etc., or such affections of the brain or cord as implicate the origin of cardiac nerves. Other, and more frequently operative, causes are: the abuse of alcohol (whiskey, brandy, absinthe) and tobacco, particularly heavy imported tobacco, and of coffee and tea. In either form a great physical exertion or violent emotion may readily act as the immediate exciting cause.

Symptoms.—Usually the patient is suddenly taken with a violent pain in the region of the heart, stabbing, lancinating, or crushing, but always agonizing; with it there is a sense of violent constriction about the heart, as though it were firmly grasped in a vise. The pain radiates upward into the (left) shoulder, sometimes into the neck and occiput, and downward into the (left) arm, often into the hands and fingers; it may involve the right side, and frequently is associated with tingling and numbness in the painful parts, including the heart. In the true angina, the patient, uttering a sharp exclamation of pain, usually grasps some firm object to support himself or rushes to the open window, at the same time making violent pressure with the left hand upon the heart. The sensation of impending death is overwhelming, and is expressed in the face by a leaden, ashy hue; the forehead is bathed in profuse cold sweat; the attitude of the body is one of rigidity. After a few moments the attack may cease as suddenly as it appeared. Occasionally the onset is gradual, the paroxysm itself being preceded by nausea, ringing in the ears, chilliness, and other symptoms of a nervous character. In other cases pain at the heart may be comparatively slight, and may be wholly masked by the horrible sensation of impending death. The action of the heart usually, but not always, is regular, with greatly increased tension; the apex beat generally is forcible and diffuse. Respiration may be regular and normally deep; less often it is shallow and jerking. The attack may pass off with copious eructations of gas, a movement from the bowels, or voiding of large amounts of limpid urine, as after violent attacks of hysteria. Fainting and even fatal syncope may occur during a paroxysm of true angina.

In some instances, the paroxysm having passed, the patient is left feeling quite well, though somewhat exhausted; in

others there is profound prostration. Recurrences take place at varying intervals, possibly every few hours, for several days; more frequently the patient enjoys excellent health for months or years, to be startled by the sudden appearance of another attack.

The so-called vaso-motor angina, described by Nothnagel, is the result of exposure to cold, and is characterized by much less violent symptoms, so far as pain and sense of impending death are concerned, with spasm of the vessels of the extremities, coldness, stiffness, numbness and sensory disturbances.

Diagnosis.—The essential feature of true angina lies in the sclerotic or atheromatous changes in the vessels associated with cardiac disease, and the diagnosis rests upon the presence of arterio-sclerosis, with ringing aortic second sound and high arterial tension. It occurs suddenly and usually follows an effort of some kind; attacks occurring in the night during sleep are due to organic disease. The appearance of the patient is characteristic; he stands rigidly fixed, the hands pressed upon the heart, transfixed with pain and alarm, a striking contrast to the nervous excitement which almost always forms a conspicuous feature of pseudo-angina. True angina resembles *cardiac* asthma, but in the latter dyspnoea is most distressing, with tendency to pulmonary œdema and moist râles. *Hysterical angina* occurs spontaneously, is more frequent in women than in men, results from causes which are closely related to hysterical affections, and is usually associated with emotional disturbances. If equally severe, it is less strictly localized; the action of the heart shows less tension, and partakes more of the character of palpitation; the patient screams with pain, is restless, moves and walks about, and in many ways betrays to the careful observer the nervous coloring of the paroxysm. The forms of pseudo-angina which depend upon poisoning with tobacco or alcohol, or are associated with neuroses, are recognized by the absence of the organic changes in the heart and vessels which pertain to true angina, by anomalies in the action of the heart which are characteristic of alcohol or tobacco-poisoning, and distinct expressions of a neurotic condition.

Prognosis.—The prognosis is always serious. Fatal syncope may occur during the first, or any subsequent, attack, and

death from a paroxysm of angina pectoris in the night is comparatively frequent; the list of sudden deaths thus occurring embraces many names distinguished in letters and in the professions. Pseudo-angina is, of course, infinitely less dangerous, and a promise of permanent relief may be given if the conditions are favorable; but even here a certain measure of reserve is admissible. Life may, however, be indefinitely prolonged if the patient escapes the operation of conditions which are liable to provoke a paroxysm. Exceptionally cures have been made of the true organic form.

Treatment.—The chief aim of persons suffering from angina should be to cultivate evenness and deliberation in all they do; worrying and hurrying invites an attack of the disease. It is hardly necessary to add that the use of alcohol, coffee, tea, and especially tobacco, must be forbidden, and that violent muscular exertion is inconsistent with safety. During a paroxysm energetic measures for relief must be applied without an instant's hesitancy. Of these, the most promising and easiest applied is amyl nitrite, of which from two to five drops are to be placed upon a handkerchief for inhalation by the patient. It affords relief to the heart by causing prompt dilatation of the arterioles; flushing of the face with lessening of tension in the arterial system are produced quickly, followed in many cases by relief of the pain. If necessary, the use of the amyl nitrite may be continued for some little time—a few minutes—but it should be stopped unless it acts with reasonable promptness. It must be administered while the patient is in an upright position. In many cases, if exhibited at once, the drug will abort an attack; hence the wisdom of directing persons liable to heart-pang to carry upon their person “perles” or little glass-tubes filled with the nitrite, which are broken in a handkerchief and are thus ready for immediate use. If relief, during a paroxysm, is not apparent within a very few minutes, chloroform or ether, preferably the latter, should be given. Often a few inhalations of either anæsthetic act like a charm, and a number of cases have been reported in which the attack could always be aborted by a few deep inhalations of ether. If still no relief is had, it may be necessary to resort to the hypodermic use of morphia, which, however, is objectionable in serious affections of the heart.

In addition, counter-irritants may be applied over the heart, preferably sinapisms, and in the milder forms and in functional angina these or the employment of heat (water at a temperature of 140° to 150° F. in a rubber bag) or of cold (ice bag, cloths wrung out of ice-cold water) are usually all-sufficient. Electricity has proved valuable, especially in idiopathic cases. "The positive pole with a broad surface has been placed by Eulenburg over the heart and sternum, and the negative on the lower cervical vertebræ. The (galvanic) current passed between these points was gradually increased until thirty cells were brought into the circuit. Von Hübner placed the positive electrode in the supra-sternal fossa, and the negative upon the cervical sympathetic ganglia, of first one and then the other side; he then moved the positive pole to the lower cervical ganglion and the negative to the sensitive spots, at the angles of both shoulder-blades. At first, weak currents, from four to six elements, were used, but gradually their strength was increased, and 8 or 10 elements were employed. By most practitioners not more than 10 or 15 cells are used. The duration of the application of the currents must also be gradually increased. Usually from one to five minutes are sufficient for its use." (Davis, in *International System of Electro-Therapeutics*.) The curative treatment of the dominant school consists chiefly of the use of nitro-glycerine, one drop of a 1-per-cent solution, two or three times daily, increasing the dose by one drop every five or six days until flushing or headache result. Strychnia and arsenic are also highly recommended. The iodide of potassium is thought to exert some specific effect upon the arterio-sclerosis, and on this account is exhibited for a considerable length of time by Huchard and others.

Therapeutics.—**ACONITE** is the most valuable remedy in vaso-motor angina from exposure to cold, with intense anxiety, coldness, pain at the heart radiating in every direction, with numbness, tingling, paræsthesia.—**AMYL NITRITE**. During the paroxysm; by inhalation; acts physiologically.—**ARSENICUM**. Fatty degeneration; irritability of the heart from smoking or excessive use of tea; excessive pain at the heart, with anxiety and fainting; worse at night, from 1 to 5 A. M.—**AURUM MURIAT**. Arterio-sclerosis; fatty degeneration, hypertrophy of heart, hypochondriasis, attacks of anguish,

with tremulous fearfulness and restlessness, driving him from place to place.—**CACTUS**. One of our best remedies. Increased action of the heart, with high arterial tension; sensation at the heart as though it were grasped in an iron hand or crushed in a vise.—**CUPRUM**, when there is chronic aortic disease, with distress and pain behind the ensiform cartilage. Extreme coldness all over. Slow pulse, choreic tendency.—**GLONOINE** (Nitroglycerine). Angina pectoris with fluttering of the heart and violent beating as though it would burst the chest open, with labored breathing, pain radiating upward and downward into the arm, with loss of power and numbness.—**KALMIA**. Intense, neuralgic pains about the heart, extending down the left arm, with extreme anguish about the heart; atheromatous condition of the vessels. In persons suffering much from wandering pains about the heart, with slow, weak pulse.—**OXALIC ACID** has been highly recommended by Pemberton Dudley. It is useful when the pain is stitch-like, confined to a small spot, aggravated from the slightest motion, and accompanied with a peculiar numbness all over, almost like palsy.—**SPIGELIA**. Sudden severe, stabbing, neuralgic pain at the heart, extending into the arm, with numbness of the arm. Tumultuous and irregular action of the heart. In pseudo-angina where the patient suffers much from neuralgic pains about the heart, associated with palpitation.—**TABACUM**. Sudden præcordial anguish; pain radiates from the heart; death-like faintness, with cold face and extremities; cold sweat all over; pinched features. Inability to lie long on the left side; paroxysms of præcordial oppression at night, coming on with such force that he is obliged to spring out of bed.

Consult also: **AGARICUS** (neuralgia about the heart; from excessive use of coffee, tea, tobacco; associated with symptoms of nerve pain at the stomach); **COCA** (helpful as a general nerve-tonic; lessens the danger of angina arising from physical exertion, especially from mountain-climbing); **CONVALLARIA** (heart-tonic; cardiac asthma rather than angina pectoris); **LACHESIS** (intolerance of pressure about the heart; sense of suffocation; feeling as though the heart were turned over; atheromatous arteries; chronic aortitis); **CIMICIFUGA** (wandering pains about the heart); **KALI IOD.** (to overcome arteriosclerosis; must be continued for a long time); **NUX VOMICA** and **STRYCHNIA**.

DISEASES OF THE BLOOD-VESSELS.

DISEASES OF THE ARTERIES.

ACUTE ARTERITIS.

A rare affection, usually occurring in the course of acute infectious diseases, as the result of general intoxication. It closely resembles endocarditis. There is more or less thickening of the intimæ, with fibrinous deposits greatly varying in size, and occasional tendency to ulceration.

The symptoms are indefinite. There is usually considerable palpitation and throbbing of the vessels, with pain in the arch of the aorta, of severe and stabbing character, substernal tenderness and soreness or, in some cases, uneasiness and pain in the right shoulder. A moderate fever is common.

The diagnosis is uncertain. The affection is not readily differentiated from *endocarditis*; a larger area of pain of greater intensity, with absence of murmur at the apex, point to arteritis. A tendency to fatal embolism—indicated by the occurrence of rigors or severe chills—and to rupture of the vessel renders the prognosis very serious.

The treatment is that of endocarditis. Absolute rest, a moderate diet, cold applications to the chest and cardiac sedatives are of particular importance.

ARTERIO-SCLEROSIS.

A condition of induration of the walls of an artery, chiefly in the musculo-elastic coat, developing slowly, characterized by simple thickening of the intimæ or "resulting in its replacement in patches of atheromatous or calcareous material, or in implication of the media and adventitia; in extreme cases converting the vessel into a cord of bony stiffness." (Foster.) The terms arterio-capillary fibrosis, arteritis deformans and atheroma are used by authors in describing this condition.

Ætiology.—Arterio-sclerosis occurs rather oftener in men than in women, and is more frequently seen in persons who have passed middle age than in the young. In fact, it is a

very common feature of old age, the result of the long-continued use or of inherited weakness and poor quality of the arterial tissue; the latter accounts for the tendency to this affection which is observed in some families, and which in such cases may show itself in the young. Renal disease is intimately connected with arterio-sclerosis, but their exact relation is not yet understood; it is probable that in the greater number of cases the blood vessels are primarily diseased. Among the constant ætiological factors are habits of life which throw an unusually severe strain upon the blood vessels by raising the blood pressure and increasing peripheral resistance. Such are chiefly habitual over-use of muscles in athletics or in laborious occupations, particularly when these involve long-maintained cramped position which interferes with freedom of circulation, as is the case with miners. Over-eating, also, especially in large persons of indolent habits, is thought to lead to arterio-sclerosis by keeping the blood vessels overfilled. In a large number of instances, notably among young people, the disease is the result of chronic intoxication, especially the intoxications of alcohol, syphilis, lead and gout. Less frequently it is associated with diabetes, malaria, or with acute infectious diseases (typhoid fever, scarlet fever, small-pox) or the cachexia of cancer and tuberculosis.

Morbid Anatomy.—Arterio-sclerosis is usually seen in the larger arteries, oftenest in the aorta, especially in the ascending portion of the arch; next in order of frequency come the iliac and femoral, the brachial, radial and ulnar, the coronary arteries and the arteries of the brain; it is rare in the gastric, hepatic and mesenteric. Small arteries may also become atheromatous. Exceptionally the veins are affected.

Thoma distinguishes a primary and secondary form. In the former, dilatation of the vessel and compensatory increase of the connective tissue of the intimæ follow local changes; in the latter, the same compensatory effort is brought about by more diffuse changes in the vessels which are the result of increased peripheral tension. The atheromatous process itself is characteristic and can be readily seen with the naked eye. The intima is covered with grayish thickenings and elevations, irregular in shape, and of varying size; they occur oftenest at a point where a smaller vessel branches off. These thickened,

nodular spots may be gelatinous or fibrinous or hard and calcified. If the latter, and if the plates formed are numerous, the entire vessel may become stiff and tube-like. In these localized changes the tendency is to necrosis (atheromatous abscess) and ulceration (atheromatous ulcer). Microscopically the intima is seen to be swollen, chiefly from extensive new growth of its connective tissue; not rarely there is superficial degeneration of the intima, while in the deeper layers extensive breaking-down of tissue takes place, with the formation of the atheromatous abscess or ulcer or of calcification plates. Similar changes, less marked than in the intima, are seen in the media and adventitia. When there is much localized dilatation, the media and adventitia may be thin, atrophied or degenerated. The process is practically a local circumscribed inflammation (mesarteritis and periarteritis) with resultant weakening of the wall of the vessel and *compensatory* thickening by proliferative changes in the intima at the seat of the weakening. If the latter, compensatory process is delayed, dilatation and aneurism may develop rapidly.

The diffuse form of arterio-sclerosis is oftenest seen in persons of middle-life and younger, especially in those of fine muscular development, and is more common in negroes than in whites. It may involve the aorta and its branches, but oftener occurs in the smaller arteries. Microscopically no striking changes may be observed, though the intima may be covered with slightly elevated, opaque spots which may present characteristic atheromatous changes. Microscopically the median coat of the vessel shows extensive necrotic and hyaline changes, with a corresponding compensatory increase in the subendothelial connective tissue. Nodular formations may, or may not, be found here. The smaller arteries in these cases may be extensively involved, the most striking changes consisting of thickening of the wall from hyaline formations within the muscular coat, often complete or partial disappearance of the elastic laminae, atrophy of the muscular fibres in the media, and pronounced tendency to fatty degeneration of structure. Affections of the heart are common in these cases, including great increase of weight of the heart itself, fibrous myocarditis, sclerosis and incompetency of the semilunar valves.

In the senile form, there is extensive dilatation and tortu-

osity of the vessels. The walls usually are thin but stiff, and the vessel is rigid like a tube. Calcareous deposits frequently are very extensive, often occupying a large portion of the inner coat of the vessel. Atheromatous abscesses and ulcers, from degeneration of the subendothelial tissues, are common. The liver and kidneys are usually atrophied, and the heart and other organs may show the structural changes characteristic of old age. The occurrence of atheromatous changes in a vessel necessarily implies loss of elasticity in the wall of the vessel and lessened powers of resistance to the blood-pressure; hence, danger of aneurismal dilatation until compensatory thickening has taken place, which, according to Thoma, is established in a year at about the fortieth year of life. If the degeneration is extensive, hypertrophy of the left ventricle is often seen, due to the extra work thrown upon it by the increased resistance in the affected vessels to the blood current and by their inability to assist in the propulsion of the blood. Nutritive disturbances in distant organs may result when the lumen of the vessel is greatly lessened by extensive thickening of the intima and by the formation of thrombi on the atheromatous structures.

Symptoms—The existence of arterio-sclerosis very often is not recognized during life, owing to the absence, in many cases, of any marked disturbances in the general health, and because of the indistinctness of such signs and symptoms as belong to it. The most reliable indications are derived from examination of the peripheral arteries, with increased arterial tension and cardiac hypertrophy.

The larger peripheral arteries (radial, femoral, temporal) in arterio-sclerosis usually feel hard, bony and "spiral," like the neck of a bird. It must, however, be remembered that an atheromatous state of these superficial vessels may be clearly demonstrated, while the internal arteries are free from disease; the reverse may obtain. The typical pulse is the *pulsus tardus*; the pulse wave is slow and sluggish in ascent and descent; during the intervals between the beats the vessel is firm, full, incompressible, and the hardness of the walls is at times such that firm pressure persistently exercised cannot obliterate the pulse at the wrist; in extreme cases of calcification no pulse may be detected. The sphygmograph "shows a gradual

ascent with a broad top and sustained wave. The tidal wave is often very marked, and the dicrotic notch, as a rule, indistinct and obliterated." Enlargement of the left ventricle of the heart is the logical result of the great amount of work which it must perform; it is associated with the physical signs peculiar to it, namely: increasing displacement downward and outward of the apex beat; heaving and forcible impulse; distinct accentuation of the second aortic sound; often a sensation of fulness about the heart. As in valvular disease, compensation once established and maintained, the general health may remain excellent for an indefinite length of time; occasionally symptoms of slight renal disturbance, as transient albuminuria, arrest the attention of the patient. Eventually, however, in the greater number of instances, the general health fails and distressing symptoms occur, either depending upon serious involvement of the heart or upon some disturbance set up in a distant organ.

In some cases cardiac insufficiency, followed by dyspnoea, serous effusion, etc., eventually declares itself. If the *coronary arteries* are involved, difficulty of breathing, sense of fulness at the heart, more or less pain, and finally true angina pectoris are not infrequent; there is also danger of fibroid degeneration of the heart, aneurism, myomalacia, rupture of the heart, or sudden death from thrombosis. *Cerebral* symptoms may develop. Headache, ringing in the ears and vertigo, sometimes attended with fainting and epileptiform seizures, are frequently seen; in fact, the lighter of these symptoms may persist throughout the course of the disease. Among the transitory symptoms experienced are palsies, aphasia and disturbances of vision. Degenerative changes occur, often preceded by disturbances in the intellectual sphere and loss of memory. Haemorrhage usually is observed late, but may take place before there is evidence of degeneration. *Renal* disease is common in senile arterio-sclerosis and in the diffuse form of younger persons; it usually assumes the expression of contracted kidney. Other conditions more or less intimately associated with arterio-sclerosis are: gangrene of the extremities, bronchitis, emphysema, and cirrhosis of the liver and pancreas.

The **diagnosis** depends upon the presence of thickening of the peripheral arteries, persistent high arterial tension, enlarge-

ment of the heart, and the age of the patient. It involves a careful study of the entire case, and is likely to be presumptive in very many instances. Differentiation of the cardiac symptoms which are peculiar to this state from those of valvular disease is both difficult and of slight practical value, since the treatment is the same.

The prognosis, as to life, is favorable, for, as in valvular disease of the heart, persons suffering from arterio-sclerosis may live to old age. The danger arising from cerebral, cardiac and renal complications is, however, sufficiently serious to warrant apprehension. A cure of the disease, once well established, and with sclerotic changes in the walls of the vessels, appears to be out of the question.

Treatment.—The difficulty of recognizing arterio-sclerosis in the early stage is so great that the question of treatment rarely arises at this time. If, however, the diagnosis is reasonably certain, pains should at once be taken, especially in persons of more advanced years, to place the patient in a position which may enable him to resist and overcome the existing tendency. It is well known that persons who suffer from this affection are much given to fretting and worrying, and clinicians lay much stress upon measures calculated to avoid and overcome this; hence the necessity of insuring to these people freedom from anxiety, a large amount of restful and refreshing sleep, and a diet which is absolutely simple, easily assimilated, nourishing and, above all, non-stimulating. The condition of the skin, bowels and kidneys should be brought as near as can be to perfect health. If there is a sense of uneasiness and muscular weakness about the heart, cardiac stimulants may be indicated; but they should be used only when positively demanded. A milk-diet is warmly advocated when there is renal trouble. If the patient be syphilitic, a course of iodide of potassium suggests itself. Huchard, Sansom, and many others, firmly maintain that the iodide of potassium or sodium, given perseveringly, even for a period of from two to four years, exerts a most desirable effect upon arterio-sclerosis, particularly when there is angina pectoris. Sansom even admits that under this treatment a complete restoration to health may be had, provided the treatment be commenced sufficiently early.

When the case has advanced, the treatment must be largely

symptomatic. If there are complications or affections of the heart, kidneys or brain, treatment must be directed to these.

ANEURISM.

An aneurism is a localized dilatation of an artery, through which blood passes. This dilatation, as the term is here used, may include rupture of one or more coats of the blood vessel or it may be due to stretching of the wall of the vessel. Many forms are recognized; for a study of these, special works must be consulted.

Ætiology.—Aneurism may occur at any period of life, even in the very young, but is found oftenest in middle life, from 35 to 50 years of age. It is more frequently observed in men than in women, undoubtedly because men in their daily vocation are much more liable to be under the operation of conditions which may prove immediate exciting causes. The two essential factors in the causation of aneurism are: diminished resistance of the wall and increased blood pressure. The former may, and very commonly does, arise from an atheromatous condition of the vessels, i. e. degeneration of the media, and, as pointed out under arterio-sclerosis, is greatest prior to the establishment of compensatory thickening of the intima. Aneurism in the arch of the aorta is commonly due to this cause. The same weakening of the wall of the vessel may be caused by laceration from a calcified embolus or by inflammatory action and subsequent softening, set up by an infected embolus or thrombus. Mycotic influences are occasionally at work, as in malignant endocarditis, and aneurism from this cause is now fully recognized. An inherited predisposition to weakness of the walls of the blood vessels undoubtedly exists, and is proved from its occurrence, in successive generations, in certain families. Syphilis, alcoholism, gout and rheumatism are also important factors. Under such conditions anything that raises the blood pressure may act as the immediate, exciting cause. Not only are persons engaged in occupations which demand great muscular exertion, as blacksmiths, sailors and miners, in especial danger of developing aneurism, but the weakened walls of a vessel may give way from the increased pressure brought about by violent straining at stool or a severe fit of

coughing. Violence is an important factor in aneurism of the peripheral arteries.

Morbid Anatomy.—Aneurisms naturally divide themselves into the circumscribed and diffuse. Of the former, the "saccular" and the "fusiform" variety are the most common and typical; they vary greatly in size, from a millet seed to the size of a fist or the head of an infant, and in numbers. A diffuse aneurism, as the term indicates, is the extensive aneurismal dilatation of a blood vessel, often involving its branches; it is "tortuous" or "serpentine" in appearance; hence the term "cirroid" or "serpentine." The "dissecting" aneurism consists of a partial rupture within the vessel, the blood "dissecting" its way between the tunics. Wm. Pepper describes a case in which "there was a transverse rupture of the media and intima near the aortic valves, from which the blood had gradually found its way along the entire length of the aorta, and by secondary ruptures into the aorta just above the bifurcation, and into one of the iliac arteries. There were practically two aortas side by side, separated by a narrow partition." Richardson, of Toronto, relates a similar case. An artery may communicate with a vein (arterio-venous aneurism); if directly, it is an aneurismal varix; if by a sac, it is described as a varicose aneurism.

The wall of an aneurism at first is composed of all the coats of the vessel; sooner or later the middle tunic yields and disappears, the intima and adventitia become thickened and adherent to each other, eventually forming one fibrous tissue. The intima often shows extensive degeneration and calcification. If eventually the wall yields and ruptures, the surrounding tissues form an adventitious wall or covering. The contents of the aneurism consist, in part, of clotted blood, which may be the means of a spontaneous cure. Its free surface is dark red and, usually, ribbed; the part of the clot which rests upon the wall is pale and brittle, and covered with elastic layers of pale reddish color. It is partly organized and subject to degenerative changes, softening and breaking down, and calcareous infiltration. It may give rise to emboli or to occlusion of the vessels. Communication between the aneurismal sac and the artery from which it arises is maintained by an opening of varying size, round or slit-shaped.

As the aneurism increases in size, it encroaches upon adjoining structures and organs, and may give rise to intense pain by pressure upon nerves, to distortion and obliteration of vessels by pressure upon branch arteries, to the formation of thrombi in veins, and to erosion and even absorption of bony structures.

ANEURISM OF THE THORACIC AORTA.

The thoracic aorta is the seat of aneurism in about 74 per cent. of all cases of aortic aneurism. It is stated that in more than one-half of all cases of aneurism of the thoracic aorta the ascending portion is the seat of the affection; the arch, in about one-fourth, and the descending portion in about one-eighth of all the cases, the frequency of aneurism lessening with increasing distance from the heart. The larger portion of the victims is furnished by persons of full muscular development and in occupations which demand great muscular exertion, especially syphilitics and alcoholics. The accident occurs usually in the earlier stages of arterio-sclerosis, prior to the full establishment of compensatory thickening of the intima. The aneurismal sac varies greatly in size and shape; it is oftener as large as a fist or an apple. The largest are seen in the ascending portion, usually are saccular, and occasionally perforate the anterior chest wall, appearing as a large external tumor. In the transverse portion fusiform dilatations are more frequently noted, and the origin of vessels arising from it is liable to be involved. If the aneurism occupies the descending portion of the arch, there may be compression of the trachea and bronchi from aneurismal sacs. In the ascending and transverse portion of the arch the seat of the aneurism almost always is on the anterior, in the descending portion of the arch on the posterior, surface, i. e. at a point where the blood current most forcibly strikes the wall of the vessel.

Symptoms.—Aneurism may exist and cause no symptoms whatever, but as soon as the tumor becomes sufficiently large to cause pressure upon the adjacent structures, the so-called "pressure symptoms" are developed. Aneurism of the *ascending* portion of the arch, if just above the sinuses of Valsalva, is usually small, and on this account causes no symptoms; rup-

ture into the pericardium may take place, with immediately fatal results. If higher, they are larger, and sometimes attain to great size, even producing large external tumors, usually making their way outward at the second or third interspace by producing erosion of the ribs and sternum. Occasionally, smaller aneurisms, by causing dilatation of the orifice of the aorta or dragging upon the valves, give rise to symptoms of aortic insufficiency. Pressure upon the superior vena cava causes venous congestion of the face, neck and arms; upon the subclavian, enlargement of the right arm, with œdema. Perforation into the superior vena cava is indicated by the sudden appearance of cyanosis and œdema. If the aneurism is large enough to dislocate the heart downwards and to the left, compression of the inferior vena cava may cause œdema of the feet and ascites. Pressure upon the azygos vein causes hydrothorax. Pressure upon the recurrent laryngeal nerve gives rise to paralysis of the right vocal cord. Pressure upon the sympathetic, by irritation of the nerve fibre, produces dilatation of the right eye; if the fibre is paralyzed, contraction follows. Pain is frequently present; it occurs in paroxysms or is persistent, and is of neuralgic, stitch-like or anginoid character. Death usually occurs from rupture into the pleura or superior vena cava; less often from rupture externally or heart-failure. Aneurism of the *transverse* portion is associated with many remarkable pressure signs, especially as there is marked protrusion toward the spine encroaching upon the trachea and œsophagus. Pressure upon the trachea gives rise to dyspnoea of a stridulous character (or asthmatic) and may be attended with tracheal and bronchial congestion or catarrh, even with blood-streaked expectoration. Compression of a bronchus is followed by cough, difficult breathing, retention of secretion, suppuration, and sometimes gangrene. Pressure upon the œsophagus and thoracic duct causes difficulty of swallowing, particularly of solid food; the use of the sound in such cases may rupture the aneurism, with fatal result. Pressure upon the left recurrent laryngeal nerve causes suffocative spells, hoarseness, paralysis of the left vocal cord, and aphonia. Pressure upon the sympathetic, dilatation, then contraction, of the pupil. œdema of the left half of the head, neck and of the left arm follows involvement of the left in-

nominate. The orifices of the vessels arising from the transverse portion of the arch may be dilated, or the vessels may be compressed or obstructed by thrombi. The radial or carotid pulse, in case of such involvement, is retarded or absent, and the difference between the pulse on the right and left side easily distinguished. The aneurism often reaches a large size, growing forward, eroding the sternum, and forming an external tumor; or it may for years lie between the vertebræ and the sternum. Aneurism of the *descending* portion is characterized by less general pressure symptoms, although compression of a bronchus and of the lung is not unusual and occasions serious results. Pain, however, is very marked, especially when erosion of the vertebræ takes place. It is usually felt in or about the left shoulder, and is due to erosion of the vertebræ and to a neuritis of implicated spinal nerves. Dysphagia is often severe. The tumor occasionally appears externally, in the scapular region, and may be of enormous size. Among the accidents likely to occur are paralysis from compression of the spinal cord and death from rupture into the œsophagus or pleura.

Pain is present in many cases; it is absent in others where the aneurism has existed for many years and has reached great dimensions. A sudden, tearing pain in the upper thorax may be felt when the vessel is injured from a violent effort. It is usually due to stretching of, or pressure upon, some nerve filament. It may be constant, with periods of exacerbation when the blood pressure is raised, or sharp, lancinating, shooting, and referred to some distant part. The neuralgic element predominates, and there may be anæsthesia of the skin and a considerable loss of power in the parts to which the pinched nerve is distributed. A constant dull, boring pain is indicative of erosion of bone. Anginal pain indicates nearness of the aneurism to the heart. *Dyspnœa* also is frequently present, depending upon pressure against the trachea, bronchi, lungs or nerve-trunks. The serious effect of compression of a bronchus has been discussed; in such cases large sibilant or sonorous râles are usually present. *Asthma* is present when branches of the vagus are implicated, associated with involvement of cardiac filaments or gastric branches. *Laryngeal* symptoms are observed in a large number of cases. Both sides may be affected,

but the left side much oftener. If only one of the vocal cords is paralyzed, speech may not be involved. The appearance of the patient may not undergo any noticeable change if there is little pain; if there is much pain, the face soon assumes a drawn and anxious expression. There is much emaciation when there is obstruction of the œsophagus and thoracic duct, and fever when there is pressure upon the lungs or bronchi.

Physical Signs.—It is to be remembered that physical signs are not to be expected when the aneurism is deep-seated. *Inspection* will necessarily prove the more valuable as the aneurismal tumor appears externally. It is oftenest seen in the second or third interspace to the right of the sternum or through the sternum, and is then usually quite large; if on the descending portion of the aorta, it is at the back, between the spine and the left scapula. The *pulsation* may, however, be distinguished when there is no external presentation of an aneurismal tumor. It often consists of a diffuse impulse, heaving in character, which in some cases is readily observed, in others can only be noticed when the chest is narrowly watched and looked at obliquely. If the aneurism is on the arch, the pulsation is sometimes felt in the root of the neck, occurring a moment later than the systole of the heart. In some cases the hand may feel a slight systolic thrill in the tumor. A large external tumor presenting, pulsation may be noted both from below upward and laterally. Large external aneurismal tumors are covered with a very thin, at times necrotic, layer of skin; if ruptured, the laminæ of the sac are exposed. Dislocation of the apex beat of the heart downward and to the left from dislocation by pressure may be observed. *Palpation* takes observance of the systolic thrill, which is especially marked when the arch is much dilated, and of the diastolic shock, which is usually communicated to the hand and is felt plainest when the aneurism is near the root of the aorta; it determines the location and expansiveness of the pulsation. The impulse is slow, strong, heaving, expansile. The latter quality is easily perceived when the hand can grasp the external tumor; when this is impossible, the expansile character of the pulsation, as Pepper points out, may be demonstrated by “placing pieces of paper edge to edge upon the skin, when the papers are seen to separate a little with each pulsation.” The presence of many

or large clots necessarily interferes with this sign. *Percussion* yields no results until the tumor is fairly large and near the surface, and cannot even then aid in determining its size, since a considerable part of it will be covered by the lung. The area of dulness is usually to the right of the sternum and above the third rib. The percussion note is flat, and there is a feeling of increased resistance. *Auscultation* is negative when the sac is occupied by extensive coagula. A soft systolic murmur is sometimes heard over the aneurism, from eddies which form in the aneurismal sac. Vibration of the walls of the aneurism occasionally produces a systolic sound. A systolic murmur may be heard over the trachea, probably the result of the expulsion of air at each distension of the sac. A diastolic murmur usually accompanies insufficiency of the semilunar valves.

The Pulse.—The mechanical slowing of the blood current in the involved arteries and in the vessels beyond the aneurism is responsible for the great difference in the force and rapidity of the pulse on the two sides of the body; this is easiest observed in the radial pulse. Osler calls attention to the obliteration of the pulse in the abdominal aorta and its branches from aneurism of the thoracic aorta. Sphygmographic tracings show no constant peculiarities. The up-stroke is usually very oblique, and the height of the curve reduced. “Tracked tugging” (Oliver) is obtained as follows: “Place the patient in the erect position, and direct him to close his mouth and elevate his chin to almost the full extent; then grasp the cricoid cartilage between the finger and thumb, and use steady and gentle upward pressure on it, when, if dilatation or aneurism exist, the pulsation of the aorta will be distinctly felt transmitted through the trachea to the hand.” This sign is valuable in deep-seated aneurism.

Diagnosis.—The difficulty of making a diagnosis of a small or deep-seated aneurism is evident. *Solid tumors*, especially of the mediastinum, sternum and base of the neck, and particularly when they project externally and are pulsating, may present difficulties that are practically insurmountable. It is then necessary to bear in mind that in tumors there is rarely found a ringing second sound and that the pulsations lack the force and the expansile character, as well as the diastolic shock, which belong to an aneurism; neither is the “tracheal tugging”

present in tumors; pressure phenomena, also, are less common. On the other hand, the history of the case may offer valuable help; thus, while aneurism more often occurs in vigorous, muscular men, frequently of a syphilitic taint, the subject of an advanced tumor is usually cachectic and may present such indications of malignant disease as secondary nodules in the axillary and cervical glands. *Pulsating pleurisy* lacks the heaving impulse and diastolic shock; there is a history of pleural effusion, an absence of pressure symptoms, and powerful throbbing which may move the whole side. Dislocation of the heart and aortic insufficiency may give rise to special symptoms which render it practically impossible to differentiate them from aneurism.

Prognosis.—The prognosis is serious, and death may occur at any time from rupture or complications. Statistics seem to show that the duration of life, after the appearance of the first definite symptoms, rarely exceeds eighteen months. A good condition of general health has an important bearing upon the case. The most hopeful cases are those of sacculated aneurism of the ascending portion of the arch; they run a more deliberate course, and spontaneous cures from hardening of a clot and subsequent shrinkage of the walls of the sac occur more frequently here than elsewhere. In the majority of cases, but not in all, rupture is soon followed by death. Pressure upon the trachea, œsophagus or bronchi indicates an early, fatal termination.

Treatment.—Spontaneous cures are occasionally brought about by clotting of the contents of the aneurismal sac and subsequent contraction of its wall; treatment aims to produce the same results. Valsalva's method, modified by Tuffnel, consists of absolute rest and greatly restricted diet, including drink, maintained for a period of three to four months. The object is to reduce to the minimum the action of the heart and the blood pressure, and by almost starving the patient to lessen the volume of blood and to increase its coagulability. The latter is also favored by the small amount of liquid allowed and, if the patient's condition warrants it, by the abstraction of from six to ten ounces of blood every fortnight. Heart-sedatives and narcotics for the relief of pain may be employed if indications for their use arise. The practical difficulties of this method,

especially in those not very robust, are evident, and it is almost always necessary to compromise by placing the patient upon this restricted diet for a few weeks, gradually returning to more generous feeding. The so-called *low* diet consists of a daily allowance of ten ounces of bread, six ounces of farinaceous pudding, one ounce of butter, and one pint of milk, divided into three meals, fish or broiled meat being added from time to time, if the diet be insupportable by the patient. The *dry* diet consists of four ounces of bread, one-half ounce of butter, and two ounces of milk, for both breakfast and supper, and three ounces each of meat and bread and one ounce of milk for dinner. Here, as in all cases of aneurism, it is advisable to keep the bowels open and to avoid straining at stool.

The use of styptics and chemicals for the purpose of coagulating the contents of the sac has practically been abandoned as ineffective and dangerous; the same applies to the introduction, into the sac, of horse hair, wire, needles, etc. The electric current, however, has in some cases proved capable of effecting a cure. Its application is as follows: "Obviously, an aneurism of the aorta, or in the iliac or femoral arteries, is much more serious than in smaller vessels. The location and probable extent should guide us in the treatment. An aneurism of the ascending aorta, for example, could only be reached and treated through the chest walls. Electrolysis offers the only surgical relief. In acting upon the blood stream in this class of tumors, only the galvanic anode should be used in the tumor.

"We will suppose that we have to deal with an aneurism in the popliteal space, which is a frequent seat of these tumors. It must be differentiated from malignant disease of the bone, or an affection of the joint, not a difficult matter, unless it has become diffused or broken down, when amputation may be necessary. Having diagnosed the tumor as an aneurism, the patient will be laid prone and the limb elevated as much as possible. The battery being in readiness, apply the cathode to the limb, or at some convenient place; cleanse the space; have an assistant make firm pressure on the artery both below and above the tumor; thrust three or four of the platinum needles boldly into the tumor; turn on a current of from twenty to thirty milliampères, and let it run for fifteen or twenty minutes, or longer if necessary. Take plenty of time. Let the tumor feel

solid before removing the needles. If your insulation be perfect, there will be but little discomfort; so do not hurry. When the clot has fully formed, turn off the current; reverse the poles by means of the pole changer on the battery; then again turn on the current for one or more minutes, or until the needles may readily be removed. The reason for this reversal is, that the clot formed by the anode is very dense and firm, the needles are firmly imbedded in it, and, if forcibly removed, bleeding will follow. By reversing the current-flow and having the negative current on the needles, the clot immediately on them will be electrolyzed off, and they will become free.

“Before attempting any such operation, the beginner should practice with the needles in freshly drawn blood, in egg-albumen, and in other coagulable substances, in order to familiarize himself with the different actions of the poles. The coagula at the cathode will appear frothy, be full of bubbles of hydrogen, easily broken down and loosened; while that at the anode, will be firm, adherent, and hold well together. For this reason, the anode is preferred for aneurismal operations.

“It is not necessary to make the pressure, before directed; only if properly done, it will facilitate the operation. The sac must be kept full. If the pressure be uneven this may not be done, when it will be better to dispense with it. There is little danger of embolism where the anode is used, and the treatment of an aneurismal tumor, wherever found, if amenable to the electric current, will be practically that just laid down. The larger the sac, the longer it will take to form a clot sufficient to close, or nearly close, the enlargement.

“Only an experienced person should attempt galvano-puncture for an aneurism of the aorta or for such a lesion in the large abdominal vessels. Axillary aneurism, if not diffused, will be treated in the same way. Indeed, for all ordinary lesions of this character galvano-puncture is the ideal method of treatment.” (Walling, in *International Syst. of Electro-Therapeutics*.) Loreta’s method consists of passing “several feet of fine silver wire through a hypodermic needle directly from the spool, so that the wire curls up within. This is attached to the positive pole, the negative being connected with a surface pad or with an insulated needle introduced into the sac. A current is then passed through as in the method of simple galvano-puncture.”

Any of these methods are applicable only in aneurisms of moderate dimensions.

Venesection may be practiced advantageously if there is great venous congestion to the head and arms or if dyspnœa is excessive, with great lividity; it is said also to relieve the pain. If the tumor is external, an ice-cap may prove of use. Iodide of potassium, five to fifteen grains daily, is credited with having accomplished excellent results even in non-syphilitic cases, but its *modus operandi* has not been explained. Of other remedies, ACONITE alone, in the hands of the dominant school, appears to be generally recommended, largely because of its action upon the heart. DIGITALIS, if used at all, must be given in exceedingly small doses; its physiological action may readily cause rupture of the aneurism. Complications and emergencies must be met as they arise. Pain must be relieved by morphia, chloroform, ice, venesection.

ACONITE, DIGITALIS, VERATRUM VIRIDE, and other remedies, may be indicated from time to time by especial conditions.

ANEURISM OF THE PULMONARY ARTERY.

Aneurism of the pulmonary artery is rare. It is associated with disturbances of the lesser circulation (phthisis, emphysema, mitral disease, etc.). In such cases dilatation of the main trunk may be great; it is usually accompanied with relative insufficiency of the semilunar. Atheromatous changes may occur in the artery, resulting in aneurism, more often of the sacculated or spindle-shaped form. The branches more frequently than the main trunk suffer from atheromatous changes, which is readily explained from the fact that disease of the surrounding tissue, as in phthisis, not only robs the vessels of their support, but more or less interferes with their nutrition, hence creates a tendency to degeneration. Rupture of these small aneurismal tumors is in many cases responsible for the more alarming hæmorrhages of phthisical patients. The symptoms closely resemble those of aneurism of the aorta, but there is in addition more profound disturbance of the pulmonary circulation, with marked lividity and dyspnœa, cough, expectoration and weakness of the right heart. The tumors rarely are large, but have a dangerous tendency to rupture into the pericar-

dium, causing immediate death. The prognosis is bad. The treatment is that of aortic aneurism.

ANEURISM OF THE CORONARY ARTERIES.

An exceedingly rare condition, and almost always latent. The aneurismal sac is small, rarely larger than a small nut, but more than one may occupy the same vessel. Rupture occurs into the pericardium or the wall of the heart, from erosion.

ANEURISM OF THE ABDOMINAL AORTA AND ITS BRANCHES.

Aneurism of the abdominal aorta is rare as compared with thoracic aneurism. It is oftenest seen in men of from thirty-five to fifty years of age. It usually occurs near the cœlic axis, especially near the root; it is generally sacculated or fusiform, and may be multiple.

The symptoms consist of sharp, shooting pains, often in the epigastric region, resembling gastralgia, frequently following the lumbar or sciatic nerve, occasionally localized in the back. Gastric symptoms, especially vomiting, may be severe; pressure upon the colon may give rise to intestinal disturbance. There is colic in case embolism of the mesenteric artery exists. Jaundice may be present. Retardation and weakness of the femoral, as compared with the radial, pulse is common. The tumor may project forward in the middle line or to the left of the median line or backward, pressing upon the spinal column, eroding the vertebræ, and eventually, by compression of the cord, give rise to paraplegia. Erosion of the vertebræ is accompanied by dull, gnawing pain. A large tumor may lie beneath the diaphragm and escape attention.—*Inspection* may demonstrate the existence of a large tumor, with heaving, forcible, expansible pulsation.—*Palpation*. The tumor may be felt. Dulness on percussion, usually not very pronounced, may be distinguished, losing itself in the left lobe of the liver.—*Ascultation*. Systolic murmur, more often at the back. Soft, whirring murmur. Rarely soft diastolic murmur.

The diagnosis depends upon ability to grasp a large, definite tumor—which exceptionally may be freely movable, with large,

heaving, expansible pulsations—and upon the existence of pressure symptoms. These distinguish aneurism from the throbbing aorta found in neurasthenia and hysteria, especially of anæmic women.

The prognosis is bad. Exceptionally a spontaneous cure may take place, but the tendency is to death from rupture into the pleura, retro-peritoneal tissues, stomach, peritoneum, intestine, bladder, or spinal canal, rarely externally. Death may also result from complete obliteration of the lumen by clotting or intestinal infarction arising from embolism of the superior mesenteric artery.

The treatment is that of thoracic aneurism. Long continued pressure upon the tumor, under chloroform, has been tried in appropriate cases, but the results have been unsatisfactory.

Aneurism of the *splenic artery* is rare. In a case related by Osler the symptoms were: Severe epigastric pain, vomiting, hæmorrhage from the stomach and from the bowels. Aneurism of the *hepatic artery* is very rare and the symptoms exceedingly indefinite. Aneurism of the *superior mesenteric artery* is very rare, and can hardly be recognized. Aneurism of the *renal artery* is less rare; the tumor usually is small; rupture gives rise to extensive retro-peritoneal hæmorrhage.

STENOSIS OF THE AORTA.

Narrowing of the aorta may be congenital. It is usually seen in women who all through life were chlorotic, backward, and had imperfectly developed genitals. Palpitation of the heart, faintness and hæmorrhagic tendency are common in such cases. The heart is almost always abnormal, either small, dilated or hypertrophied; valvular disease is common. The condition may only be suspected, but cannot be distinctly recognized, during life. A localized narrowing of the aorta may exist near the insertion of the ductus arteriosus, and dates back to the period immediately following birth. It is associated with other abnormalities of the heart. If not great, it may be corrected by secondary hypertrophy of the left ventricle and the establishment of collateral circulation. In such cases persons may live to advanced age. More often, however, the circulation eventually becomes embarrassed and death results from dropsy. Exceptionally stenosis of the aorta results from

enlargement of mediastinal glands or syphilitic infiltration of the wall of the aorta.

RUPTURE OF THE AORTA.

Rupture of the aorta, save when directly due to a wound, as a stab with a knife, rarely occurs in a previously healthy vessel. It is almost always associated with arterio-sclerosis; in the absence of atheroma, a congenital weakness at some point along the wall of the vessel will explain the occurrence of the accident. There may be special exciting causes, as violent straining when at stool or making some special effort, a blow on the chest, a fall, etc.; if the artery is diseased, no immediate exciting cause may appear. The symptoms at the time of rupture usually are: agonizing, sudden pain, with a feeling as though some vital part had burst, with sensation of impending death, followed by fatal collapse. If the intima and media alone are torn (dissecting aneurism) the accident is not immediately fatal; a considerable length of time may elapse before the rupture of the adventitia takes place.

DISEASES OF VEINS.

PHLEBITIS.

An inflammation of the coats of a vein, associated with changes in the blood passing through the inflamed spot, arising either from a thrombus (endo-phlebitis or thrombo-phlebitis) or from primary involvement of the wall of the vessel from extension of inflammation of adjacent structures (periphlebitis); the former is the more common.

Ætiology.—Endo-phlebitis practically depends upon the formation of a thrombus; hence, sluggishness of the flow of blood and abnormal tendency to coagulation of the blood must be present. It is common in conditions of greatly lowered vitality (phthisis), in septic conditions, and as a complication or sequel of acute infectious diseases. One of the best known forms is that occurring during the lying-in period of women (*phlegmasia alba dolens*). Periphlebitis, the form of phlebitis in which

the wall of the vessel is affected first and the thrombosis is secondary, may result from traumatism, as in the ligation of a vein, but is far more frequently found from extension of a diffuse cellulitis, after operations, etc., particularly in the presence of insanitary surroundings; it is somewhat allied to phlegmonous erysipelas.

Morbid Anatomy.—The pathology of endo-phlebitis depends largely upon the fact that coagulated blood, unlike fluid blood, attaches itself to the inner coat of the vein, setting up irritation, congestion in the vasa vasorum, and injection and thickening in the sheath and outer and middle coats of the vein, eventually resulting in firm adhesion between the wall of the vessel and the thrombus. Liquefaction of the thrombus may restore the vessel to its normal state, or the adhesion may increase in firmness and intimacy, converting it into a fibrous cord (obliterative phlebitis); or the thrombus may undergo calcareous infiltration (phlebolites or vein stones). In periphlebitis the sheath and the outer coat are affected first, from infection by pus contained within the loose connective tissue surrounding the vessel, and originating either in an open wound, or in an ulcer, abscess, or extravasation of blood, or any breaking-down of tissue. The vascularity of the outer coat is greatly increased and the wall of the vein much thickened from cellular infiltration, so that upon transverse section the walls no longer approach each other. The inner coat becomes dull and leaden, stained with blood-pigment wherever there is an adhering clot, and thickened and roughened, thus affording opportunity for the coagulation of the blood-fibrin and the formation of a thrombus. The adhesion between the wall of the vessel and the thrombus is loose; thus the entire thrombus may be dislodged and carried along into the circulation, with fatal results; or it may be rapidly broken up and smaller portions of it carried into the circulation as emboli, producing metastatic abscesses. The formation of pus in the walls of the vessel (suppurative phlebitis) is not uncommon; abscess may also be caused by breaking-down of the clot. Often, when the phlebitis arises from a wound, or similar cause, the inflammation extends along the sheath of the vein for a considerable distance, the phlebitis occurring at some point above, presumably determined by the looseness of the tissues.

Symptoms.—Pain and tenderness upon pressure is present in the greater number of cases, and almost always when a large vein is inflamed; the pain may be intermittent and neuralgic. If the affected vessel is superficial, a dusky red line can be traced along its course, the vessel itself feeling hard, coral-like and somewhat knotted; usually there is more or less œdema, soft and easily pitting upon pressure. If the affected vein lies deep, the superficial veins may be painlessly enlarged; swelling is pale, hard and tense, and the pain usually greater. The temperature is at first somewhat raised; it falls below normal with the failure of circulation. Constitutional symptoms are not often pronounced, save when there is embolism, thrombosis or suppuration, in which case symptoms indicative of pyæmia rapidly develop. Suppurative phlebitis is most frequently seen in the portal vein.

Diagnosis.—*Lymphangitis* may closely resemble phlebitis, but the inflammation is more diffuse, the redness brighter, and there is present adenitis. In erysipelas the redness is more diffuse, resembling a "blush."

The prognosis is favorable, save in the suppurative form, which is almost surely fatal when occurring in an inner organ.

Treatment.—Absolute rest of the affected part is of chief importance. All handling and manipulating of the affected limb must be interdicted, since by this means a thrombus may easily be dislodged and sent into the circulation with fatal effect. It is well to carefully wrap the limb in cotton-wool, secured by a few loose spiral turns of a roller bandage, slightly elevate it, and hold it in place by sand-bags or splints. Counter-irritation by iodine or blisters is worse than useless in the majority of cases. Hot fomentations are not only soothing to the patient, but infinitely more helpful than counter-irritation. Occasionally, when there is much congestion, leeching gives good results. If abscesses form, they must be opened, with poulticing before and after the use of the knife. The treatment of suppurative phlebitis is that of pyæmia.

Therapeutics.—**ACONITE** is of service when there is high and characteristic fever; active inflammation. Great dryness, thirst, restlessness.—**APIS.** Transparent, white œdematous swelling, with stinging pains in the affected parts. Fever without thirst; scantiness of urine.—**HAMAMELIS.** Soreness and

swelling of the legs, often extending clear up to the trunk. Veins hard and swollen, knotty. Often gives excellent results when applied locally in hot water, preferably as a strong solution of the distilled extract.—*PULSATILLA* is exceedingly useful when the swelling is pale. Characteristic mental symptoms. In lying-in women. Shivering, but wants air. Suppression of lochia and milk.—*LACHESIS*. Bluish, mottled appearance of the parts. In lying-in women. Excessive sensitiveness to the touch. Low state of vitality. Suppurative phlebitis of the portal vein.

If there is suppuration, consult *HEPAR SULPH.*, *SILICA*, *ARSENICUM*.

DILATATION OF THE VEINS.

This condition, also called phlebectasis, varix, varicose veins, may occur in any part of the body, but is oftenest seen in the legs and in the plexuses about the rectum and spermatic cord. It is more frequent in women than in men and in the old than in young persons.

Its *ætiology* consists chiefly of conditions which interfere with the free passage of blood through the veins; hence among its causes we find cardiac affections characterized by weak impulse of the heart, obstruction in the arteries, cirrhosis of the liver, etc.; among those acting more directly, mention may be made of the pressure of a gravid uterus or of a rectum filled with *fæcal* matter, or the constant pressure upon the veins of the lower leg from following an occupation which necessitates standing a great deal, especially leaning forward; a tight garter or a truss may produce the same effect. It is probable that in advanced age the vessels themselves from weakness show a special predisposition to dilatation.

Morbid Anatomy.—A simple dilatation of the vessel, caused by pressure within, is followed by hypertrophy of the muscle-cells in the middle coat and hyperplasia of the connective tissue in all the coats. The vessel thus increases in thickness and length, assuming a tortuous appearance, wavy in outline and irregular in calibre. The valves also hypertrophy, but after a time are rendered ineffective from the progressive dilatation of the vessel, and shrink into useless fibrinous bands behind whose

folds blood is retained and coagulates, forming a thrombus. In the course of time the surrounding tissue thickens, eventually to encroach upon the vein and strangle it. If the vessels of the skin overlying a varicosis are destroyed, an ulcer results. A vein may approach the surface by pressure thinning the overlying tissues; its own walls are also thinned and ruptured, resulting in hæmorrhage that may prove fatal.

Symptoms.—These are unmistakable if, as is usually the case, the vessel can be examined by the eye and touch. The constitutional symptoms consist of dull, aching pain in the parts, with a sense of painful fulness and distension, often with great soreness, much increased by walking or standing. A hard, resisting œdema of adjacent parts may be present. The stasis of the blood often gives rise to eczema and indolent ulceration. Varicosis of the hæmorrhoidal veins may be accompanied with intense inflammation.

Treatment.—Whenever the cause can be reached, it must be done promptly. If the varicosis is in the leg, an elastic bandage should be applied, and rest maintained in the recumbent position and with the leg slightly elevated. Very often surgical means alone are efficient, bringing about obliteration of the vessel.

The remedies upon which most dependence can be placed are HAMAMELIS, BELLADONNA, PULSATILLA, NUX VOMICA, SULPHUR. Remedies may be very useful in reaching the primary cause; thus, remedies acting upon the liver often are most efficient in curing varicosis depending upon hepatic disease; in the same way DIGITALIS, CACTUS, STRYCHNIA, and other cardiac stimulants, may afford relief when the first cause lies in a weak heart; and NUX, ÆSCULUS, COLLINSONIA and LYCOPODIUM are often of greater value in the treatment of varicosis of the plexus of veins about the rectum than recent and at the present very popular surgical methods. A close study of the materia medica here very often excels in radically curative effects the knife of the surgeon.

PART IX.

DISEASES OF THE BLOOD AND
DUCTLESS GLANDS.

PART IX.

Diseases of the Blood and Ductless Glands.

ANÆMIA.

The term anæmia covers a diminution of the amount of blood in the body or a diminution of some of its important constituents, chiefly hæmoglobin and albumin, involving a deterioration in quality. The condition, as here considered, may be primary or secondary; of these the secondary form is by far the more common, and will be considered first.

SECONDARY ANÆMIA.

Secondary anæmia is the result of abnormal processes usually found under one of the following: *Hæmorrhage*, which may be spontaneous or follow some injury. If large and rapid, it frequently proves fatal, not so much from the great amount of blood lost, as from the rapid lowering of arterial tension. A very rapid hæmorrhage with the loss of only a few pounds of blood may prove fatal, while slow bleeding, involving the loss of a much greater amount of blood, may not prove equally serious. The effect of small, but frequently repeated, bleeding—as in purpura, uterine cancer, etc.—may give rise to rapidly fatal anæmia, as may also a single severe hæmorrhage. The very young and the old cannot endure as great a loss of blood as persons in the prime of life. It is estimated that the loss of one-third of the whole amount of blood is necessarily fatal. The process of regeneration is rapid. Watery and saline constitu-

ents are easily replenished from the gastro-intestinal tract; the blood corpuscles are restored rapidly, hæmoglobin somewhat more slowly. *Inanition*, the result of deficient supply of food or of some condition, like stenosis of the œsophagus or chronic dyspepsia, which interferes with digestion and assimilation. In these cases the blood plasma suffers most. A heavy drain on the *albuminous materials* of the blood, as occurs in prolonged lactation, Bright's disease, chronic suppuration, etc. *Poisoning* by mercury, arsenic, lead and phosphorus or the toxic action of the specific organisms of *malaria*, *syphilis*, *tuberculosis*, etc. The red corpuscles here are destroyed or their consumption greatly increased.

The symptoms of acute anæmia, such as results from severe bleeding, are pallor, cyanosis, collapse, with cold and clammy skin, weak and fluttering action of the heart, dizziness, ringing in the ears, faintness, dyspnœa, anxiety about the heart, nausea and vomiting, fainting, sometimes convulsions, and prolonged loss of consciousness. Chronic anæmia is characterized chiefly by a cachectic state, with gray or greenish-gray appearance of the face, emaciation, weak and irritable heart, relative valvular insufficiency, anæmic murmurs heard over the vessels, especially at the root of the neck. Later, œdema, first about the ankles, in the serous sacs, albuminuria, bronchial catarrh, pulmonary œdema; all these are associated with dyspepsia, menstrual disturbances (amenorrhœa), sleeplessness, mental and nervous disorders.

The **treatment** consists of removal of the cause, rest and generous diet. The administration of iron in some form (chalybeate waters, tartrate of iron and potassium, officinal tincture of perchloride of iron, Bland's pills) is universally recommended. Light doses of the tincture of CINCHONA in water, frequently administered, is an exceedingly useful remedy in overcoming the effects of a severe hæmorrhage. Other remedies will be considered in subsequent chapters.

PRIMARY OR ESSENTIAL ANÆMIA.

CHLOROSIS.

An affection characterized by a deficiency of hæmoglobin in the blood, without a corresponding diminution of corpuscles, with constitutional symptoms of chronic anæmia.

Ætiology.—Chlorosis occurs so frequently in young women at the age of puberty that it is almost considered a disease peculiar to young girlhood. Cases are, however, recorded in which the affection appeared in women who had long passed this period of life, as late as the forty-fifth year, and in young men at the age of puberty. The disease seems to have a preference for delicate blondes. The patient may show the pallor of chlorosis for a considerable period prior to the appearance of menstruation, which proves tardy and scanty, with a fixed tendency to amenorrhœa. Heredity is distinctly recognized in many cases, and some writers assume that it occurs with more than usual frequency in those of tubercular tendency.

The essential nature of chlorosis is not understood. By some it is thought to be primarily a disease of the blood. Virchow considers it a congenital hyperplasia of the vascular system. Many believe that it is of nervous origin, and in defence of this position cite its occurrence after violent emotions, homesickness, jealousy, or disappointment in love. Masturbation and other sexual vices has been thought the chief factor, but there is no conclusive evidence to sustain the assertion. Sir Andrew Clark is inclined to consider it the result of auto-intoxication, putrefactive matter being absorbed from the colon; Pick admits that the absorption of such products into the system is the responsible factor, but claims that they are obtained from a dilated stomach. This great divergence of opinions shows how little is really known of the ætiology of the affection. It appears as though an inherited dyscrasia of the blood might be an important factor, readily assuming a serious aspect under conditions which lower the tone of the system and lessen its powers of resistance. Thus whatever depresses the nervous system, be it a severe disappointment, sexual vice or violent disturbances in the emotional sphere, would have important bearing upon the case. In the same manner we can largely account for the fact that, as a rule, chlorosis seeks its victims among young girls who either have grown up amid unfavorable, insanitary surroundings or who by close confinement to some steady in-door occupation, as sewing or working in badly ventilated factories, have been deprived of the fresh air, sunshine and abundance of good nourishing food which the period of adolescence imperatively demands.

Symptoms.—Chlorosis may be a transient condition, passing away after a few weeks or months, possibly recurring, or it runs a steady course of considerable duration. The onset may be sudden; oftener it is gradual. A sense of slowly increasing weakness is noticed, with an inclination to sleep long and often, both day and night. There is pallor of the face, headache, dizziness, blurred vision, easy fatigue and embarrassment of breathing from slight exertion, palpitation of the heart, delayed and scanty menstruation, at times well defined amenorrhœa. It is the occurrence of menstrual trouble, with the "run-down" state of the system, which usually first brings the patient to the physician. Her appearance then is that of chronic anæmia, with some œdema about the eyes and ankles; there is evidence of insufficient oxygenating power of the blood in the easily excited dyspnœa, tendency to fainting and palpitation of the heart, with a rather rapid, excited pulse and a considerable increase of the respiration both when awake and during sleep. The mucous membrane of the mouth and tongue looks pale, and the skin is of a greenish-yellow tinge (green-sickness), which is diagnostic. Exceptionally the dilated blood vessels of the cheeks show plainly and give to them a flushed appearance (chlorosis rubra). The body is almost always well nourished. The appetite is poor and perverted, the patient having a strong craving for sweets, pickles, chalk, slate pencils or other indigestible substances. Eructations and regurgitation of food, especially in the morning, is common, and in many cases there is severe gastralgia. The digestive symptoms, on account of their severity and the constancy of their occurrence, have been carefully studied; the existence of an excess of free hydrochloric acid has been demonstrated by Oswald; there is usually a decided lack of motor activity, and dilatation of the stomach is often present. It is on this account that several European authorities of eminence strongly advocate lavage of the stomach in the treatment of chlorosis, and claim for it good results. The bowels are constipated in a majority of cases. Derangements of the menstrual function naturally become the object of special concern to the patient; amenorrhœa is the rule; exceptionally menorrhagia has been observed. With this general decline of health the nervous system suffers, and headache, usually vertical, nervous irritability, hysterical manifestations

and neuralgia are common. Fever is not often present, but a "febrile chlorosis" is described in which there is daily elevation of the temperature. The urine is normal; sometimes, especially when there is a decided hysterical tendency, it is pale, occasionally slightly alkaline, with a specific gravity of about 1.015. The heart may be slightly enlarged; severe palpitation is common; murmurs are frequent; there is a systolic soufflé at the base, usually in the pulmonary region; accentuation of the second sound of the pulmonary valve is often heard; venous hum or "bruit de diable" is easily perceived in the right internal jugular vein.

Examination of the blood shows that in all severe cases, and usually in light cases, there is a diminution of the red globules (oligocythæmia), but that the essential feature is a great diminution of the hæmoglobin, of which not more than 35 or 40 per cent. may be present. This is easily recognized by the striking pallor of the corpuscles when a drop of fresh blood is examined under the microscope. Poikilocytosis is rare; sometimes nucleated cells may be seen.

Gastric ulcer, transitory nephritis, and venous thrombosis are frequent complications. The latter occurs oftenest in the femoral and brachial veins, and is then comparatively harmless; occasionally there is thrombosis of the longitudinal sinus, with, sometimes, fatal results.

Diagnosis.—The diagnosis rarely presents much difficulty; but it is necessary to exclude tubercular disease of the lungs in its early stage, and organic disease of the heart and kidneys. It is evident that a carefully made microscopic examination of the blood is almost indispensable to a positive diagnosis. The absence of causes of a secondary anæmia must also be carefully considered. The clinical history of the case and the course of the symptoms is of importance, since in advanced cases of chlorosis there may be a great diminution of the number of red blood corpuscles as well as a lowering of the percentage of hæmoglobin.

The **prognosis** is favorable. Relapses occur when treatment is discontinued too soon, often from pregnancy, and at times without apparent cause; it is said that a special tendency to recurrence of the affection exists in the third decade of life. The disease may prove fatal from ulceration of the stomach, venous

thrombosis, or from congenital anomaly of the genital or vascular systems.

Treatment.—In all cases, light or severe, efforts must be made to regenerate the blood by appropriate changes in the surroundings, habits, and diet of the patient; to such measures the patient often responds with surprising promptness. The tendency to relapse is, however, so great that it is wise to inform the patient on the start of the necessity of prolonging treatment, regardless of any improvement in the symptoms until the blood has fully regained its normal condition. A change of some sort in surroundings is almost always advisable, from the city to the country, from the mountains to the seashore, from the sea-level to the hills. The change made, the patient must be directed to spend in the open air such time as she is not resting. There is great need of abundant rest, and often mischief is done by encouraging an amount of exercise which exhausts the patient. It is always best, even in light cases, to positively prohibit exercise to the extent of becoming fatigued, and in severe cases absolute rest in bed, with systematic and generous feeding, as practised in some forms of neurasthenia, is indispensable. The diet is to be carefully regulated. It must be nutritious and easily digested. It should be rich in albumin. Milk is good, but not as an exclusive diet. Carbohydrates and fats are of advantage when the patient is thin and lean. Alcoholic stimulants should be excluded, but beer and heavy porter may prove grateful and increase the desire for food. Hot salt-water baths may be taken two or three times each week, not to exceed fifteen minutes in duration. Often the momentary hot douche, followed by a momentary cold douche, is very valuable. Some practitioners claim to have derived benefit from the cold pack; its usefulness depends upon the patient's power to react promptly. Particular care must be taken when there are symptoms of approaching menstrual flow. The patient must then be given hot hip-baths and kept in bed until the flow has ceased; hot drinks (ginger, etc.) are useful at this time. Constipation should be managed by the free use of fruits and of appropriate food, as Graham bread. Laxatives are not satisfactory. The use of some form of iron (Bland's pills, two five-grain pills after each meal; chalybeate waters; Gude's peptomangan) is still the favorite prescription with the great body

of practitioners. Arsenic (two drops of Fowler's solution after each meal) is often serviceable; hydrochloric acid (ten to fifteen drops in a wine-glassful of water) relieves many of the distressing gastric symptoms; lavage of the stomach is warmly advocated by some authorities; Strychnine and other powerful tonics are occasionally helpful.

Therapeutics.—Of the long list of remedies which suggests itself here, FERRUM, CALCAREA, PULSATILLA and NATRUM MURIATICUM are the most frequently indicated and useful. FERRUM has great prostration and muscular weakness, so that the patient quickly tires from even a slight exertion; restlessness; she cannot keep quiet, and although perfectly exhausted from moving about, feels that she must keep on the move. With this restlessness there is great sensitiveness to pain of any kind. Chilliness during a great portion of the day, with feverish flushing at night. Despondency; hypochondriasis; melancholia. Pallor of the face and of the mucous membranes; yet, the face flushes easily from the slightest exertion or mental excitement. Vertigo, with flushing of the face, from stooping forward or riding in a car, or from making a motion, with ringing in the ears. Violent headache, worse from motion, with flushed face, cold hands and feet, and weak, soft pulse. Oppression in the chest, dyspnœa, rapid action of the heart; palpitation. Anorexia; dislikes the very food her condition demands; oppressive, cramp-like pain after eating; gastralgia. The menses are pale, acrid, watery, followed by milky, acrid leucorrhœa.—CALCAREA CARBONICA. It profoundly affects the general nutrition. Acts best in those of fair complexion, fat, weak, slow of action and motion, who perspire easily and profusely, and whose extremities are habitually cold. The disposition is anxious, brooding and fretful; fusses about, but accomplishes nothing, yet is greatly prostrated, as though she had done a great deal. Is tired particularly from climbing up-stairs or going up even a slight ascent. Palpitation of the heart, brought on often by brooding over the dreadful things she fancies are going to happen. Congestive headaches and chronic headaches with pale face and cold feet. Indigestion. Intense craving for indigestible substances, hard boiled eggs, chalk, etc. Everything eaten turns sour; sour eructations; bloated abdomen. Amenorrhœa of young girls, with headaches (CALC. PHOS.

in anæmic young school-girls, with constant headache on top of head, dyspnœa from going up-stairs), congestion to the head, profuse, milky leucorrhœa.—*PULSATILLA*. In girls of mild, yielding disposition, who fancy themselves overburdened with care, and thus grow despondent. Weakness, with disinclination to exertion. Feels tired and lazy; wants to sleep all the while, not only late in the morning, but for hours during the day; if she, after considerable persuasion, is induced to take a short walk, comes home tired and wants to lie down and sleep. Feels chilly, with burning heat at night, without thirst; longing for fresh air; palpitation. Headache, chiefly in the forehead, worse in the room and from trying to think; better in the open air. Vertigo, particularly from looking up, with nausea and indigestion. Indigestion; digestion is exceedingly slow; tongue heavily furred, taste bitter, appetite gone; chilliness; all the symptoms worse from eating. Craves acids. Gastralgia. Regurgitation of food. Menstruation is delayed; menstrual headaches; pudenda hot and swollen; thick, bland leucorrhœa.—*NATRUM MURIATICUM*. Depression of spirits, great sadness, she is disheartened and wants to be left to herself; or irritability and ill humor. Periods of depression, accompanied with palpitation and sense of coldness about the heart; awakens in the morning sad and depressed, with headache, patchy tongue, palpitation, etc. Severe headache, usually frontal, with dizziness; vertigo, with tendency to fall forward and to the left. Stubborn constipation, with sense of constriction at the anus and difficult expulsion of the stool; dry, hard stools. Delayed menstruation, dysmenorrhœa, menstrual headache, with weakness, abdominal soreness, thirst, dryness of the mouth; back aches as though broken; feels better when lying on the back, on a pillow. Circulation is easily excited; any exertion, even though slight, causes throbbing all over the body.

Other remedies frequently indicated are: *CYCLAMEN*. Resembles *PULSATILLA* in the mental sphere, and differs from it in its absolute dread of fresh air. One-sided headaches, anæmic in origin, with much debility, in girls suffering from menstrual derangements. Indigestion, with dislike of fat. Chlorosis with scanty and suppressed menstruation; chilliness, gastric discomfort, etc.—*GRAPHITES*. In large, fleshy persons, with tendency

to herpetic eruptions. Flushing of the face (FERRUM), rush of blood to the head; menses scanty, delayed, pale; profuse leucorrhœa; constipation; face pale, yellowish; œdema of eyelids and external genitalia; gastralgia some hours after eating, worse from cold drinks.—PHOSPHORUS. In thin, narrow-chested persons, with tubercular tendency. Mental and physical exhaustion; "leucorrhœa of a whitish, watery slime, especially profuse during the time of the menses, sometimes acrid and corroding." Gastric ulcer. In very tedious chronic cases.—If constipation is a prominent symptom, consult also: ALUMINA, ANTIMONIUM CRUDUM (great indisposition to physical exertion; irregular stool), BRYONIA, NUX VOMICA, PLUMBUM, SULPHUR. If there are marked disturbances of the sexual function, consult HELONIAS, SABINA, SEPIA. CUPRUM is said to act well after the abuse of iron; worse during hot weather.

PROGRESSIVE PERNICIOUS ANÆMIA.

This form of anæmia, first described by Addison, and known also as "idiopathic" and "essential" anæmia, is characterized by an enormous diminution of red blood-corpuscles with relatively less striking diminution of hæmoglobin. Absolutely nothing is known of its causation. Cases of fatal secondary anæmia due to such causes as hæmorrhage from disease or injury or to the presence of animal parasites in the intestine (as the anchylostomum duodenale or the filaria sanguinis hominis) are excluded from consideration here. The disease is not restricted to any geographical limit, occurs oftener in the middle-aged, rarely in the young, is rather more frequent in women than in men, and, it is thought, has some connection, ætiologically, with pregnancy, parturition, and mental shock. Three cases, recently observed, occurred in women who had just passed the climacteric period; two of these had excellent antecedents as to health and mode of living, and were of a decidedly nervous temperament and of energetic habit.

Morbid Anatomy.—The most striking feature is the pallor of the bodily surface, mucous membrane and organs, the skin partaking of a tinge of light lemon-yellow. The body usually is well nourished, and there is a full normal amount of adipose tissue. Fatty degeneration of the heart, kidneys and liver, espe-

cially of the heart, is common and frequently extensive; the intima of the small vessels may also show fatty degeneration. It is not unusual to see minute hæmorrhages in the organs, mucous and serous membranes, and occasionally in the skin. The yellow marrow is diminished in amount; the marrow appears red and contains many red blood corpuscles; i. e. hæmoblastic red marrow. "In a case reported by Rindfleisch the marrow appeared to be one large mass of nucleated red cells, and Rindfleisch is inclined to think that the cause of pernicious anæmia was an inability of the organism to change the nucleated red cells into the normal non-nucleated red blood corpuscles" (Osler).

Symptoms.—Usually the disease develops with such insidiousness that it is impossible to fix the exact time of its beginning. The patient tires from slight exertion, is short-breathed and experiences some palpitation of the heart; pallor of the lips, tongue, and skin attracts attention, but often is treated lightly because there is no loss of flesh and the constitutional symptoms are not severe. Later there may be more or less headache, in some cases with ringing in the ears and vertigo, and the skin gradually assumes the light lemon-yellow tint. The appetite is variable, usually poor; there may be nausea, vomiting and diarrhœa. Thirst and great fetor of the breath are common. Less often the appetite is good, even craving, and in such cases constipation is the rule. Epigastric tenderness is almost always present. The liver is normal or slightly enlarged; the spleen may present an increased area of dulness. The patient now complains more and more of increasing debility, and is content to spend a great portion of her time in bed. There is dyspnœa, which in some instances occurs early, and frequently becomes a source of great suffering; eventually there may be pulmonary œdema and dropsy. The urine shows an increase of urea and uric acid, is dark, of low specific gravity, and under the spectroscope shows pathological urobilin. There may be no fever, but in the greater number of cases there are irregular, remittent periods during which the temperature is elevated, sometimes quite high. More or less complaint is usually made of a sense of fullness about the heart or, in others, of a sense of great cardiac weakness. Physical examination shows a loud venous hum in the neck, with various murmurs

in the region of the heart, visible throbbing in the large arteries, and sometimes capillary pulse. Œdema of the ankle becomes pronounced; the weakness increases; hæmorrhagic effusions into the skin and mucous membrane are observed; more rarely retinal hæmorrhage occurs, with narrowing of the field of vision and blindness; the mind wanders, and the patient gradually falls into a state of extreme prostration, terminating in death.

In some cases the nervous system especially suffers from the anæmic state, presenting symptoms which closely resemble neurasthenia. There is insomnia, occasionally alternating with sopor, sensory disturbances, "band-like" sensations, strange discomfort in the head, rarely amounting to severe pain, but associated with confusion of ideas and slow, hesitating, even incorrect, speech, numbness and tingling in the hands and feet, with paralytic weakness in the extremities. Unless the anæmia has progressed far, this rarely occurring, yet distinct, form may become a source of some perplexity in rendering an immediate diagnosis.

An examination of the blood shows it thin, pale, amber-like; exceptionally it is dark and deficient in iron. Oligocythæmia is always very pronounced, but the loss in hæmoglobin is not as great as that of red blood corpuscles, a point of importance in differentiating between progressive anæmia and chlorosis or secondary anæmia. Under the microscope one-fourth, or more, of the blood corpuscles appear very large (macrocytes), while others are below the normal in size (microcytes), and a very large percentage of them is misshapen (poikilocytic). The number of leucocytes is normal or slightly below normal. A striking feature is the absence of the "rouleaux" in which the red corpuscles naturally arrange themselves; here they are irregularly scattered over the entire field.

Diagnosis.—The differentiation of progressive anæmia from chlorosis or secondary anæmia rests upon the progressive nature of the disease, the lemon-yellow color of the skin, the inability to find an immediate cause for the occurrence of the disease, the presence of hæmorrhagic effusions, especially into the retina, and the result of careful examination of the blood, with particular attention to the relative proportion of the red corpuscles and hæmoglobin.

The prognosis is very serious. Death usually occurs in one or two years, in the majority of cases from exhaustion or marasmus.

Treatment.—Rest in bed and careful attention to diet are exceedingly important. It is not good practice to send such cases far from home; they, more than almost any other class of patients, require the comforts which a well regulated home alone can give, and must most closely economize their strength. The diet should be nourishing and not tax the digestive powers. Massage frequently is of great service. Iron has proved wholly disappointing. Arsenic (arsenious acid; Fowler's Solution) is the only remedy credited with cures in a small number of cases. Two drops of Fowler's solution should be given three times a day, after each meal, and increased slightly every few days, perhaps every week. It is usually well borne, but must be discontinued if it disturbs the digestion or the urine becomes albuminous. The drug should not be discontinued because of slight puffing of the face unless the urine contains albumin. There is no proof that transfusion of blood has yielded permanent good results, and the operation itself is not free from danger. Of late the bone-marrow treatment has found a few warm advocates, but the evidence in its favor is not conclusive. The raw red marrow from calves or other young animals may be given in glycerine, extract or capsule. Feeding by the œsophageal tube may become necessary. The long-continued use of Gude's pepto-mangan appears occasionally to benefit the patient. Clinicians of the homœopathic school have added little to the therapeutics of the disease. They, also, have found in ARSENIC the remedy which accomplishes most, usually giving it in the form of low triturations of arsenious acid, when symptomatically indicated. PHOSPHORUS, PICRIC ACID and IODINE (ARSENICUM IODATUM) should be carefully studied.

LEUKÆMIA.

An affection characterized by a remarkable and persistent increase of white corpuscles. It is associated with changes either in the spleen and bone-marrow, the blood showing an increase in elements derived from these organs (spleno-medullary leucæmia), or with changes in the lymphatic glands, the blood showing an increase of elements derived from them (lym-

phatic leukæmia). Frequently the form of the affection is mixed.

Ætiology.—The essential cause of leukæmia is unknown. The disease usually occurs in middle life, but has been observed in the very young and in the aged. Men are its victims oftener than women; if in the latter, pregnancy and the climacteric period appear to be factors. The poor and those living amidst insanitary surroundings, and persons who have had serious afflictions or mental trouble, seem especially liable to it. In other cases leukæmia follows tedious, exhausting diseases, as malaria, tuberculosis, syphilis, rickets; Gowers, in his table of 150 cases, furnishes thirty cases in which leukæmia followed intermittent fever. In some cases no cause whatever can be found. Heredity is beyond doubt a factor of some importance.

Morbid Anatomy.—The essential feature is an increase of the white blood corpuscles, which in a normal state exist in proportion of 1:300 or 1:400; in leukæmia they reach the proportion of 1:40 to 1:10, and in very severe cases even of 1:3 or 1:2; exceptionally, 1:1. Hyperplasia of the organs which are intimately connected with the white corpuscles, i. e., spleen, marrow and lymphatic glands, is in all cases conspicuous. Each of these may be affected alone or all may be simultaneously involved; usually the spleen and the bone-marrow are affected at the same time.

The enlargement of the *spleen* is often enormous, the organ weighing from three or four to thirteen, and even eighteen, pounds, and measuring a foot in length. It is resistant to the knife and, when cut, of reddish-brown, later of yellowish, color. Adhesions to the diaphragm, stomach or abdominal wall are frequent. Microscopically there is "enlargement of the blood vessels and a great increase in the cells of the pulp and of the follicles. Sometimes the hyperplasia of the follicles predominates, giving the spleen a spotted appearance, like marble. In such cases the pulp usually presents retrograde metamorphosis, with atrophy and fatty degeneration of its cells and deposits of pigment. In advanced cases a considerable amount of firm connective tissue may be present. There are often hæmorrhagic infarctions, presenting the appearance of circumscribed spots, dark red, or in the later stages brownish-yellow, in color" (Struempell). The *bone-marrow* undergoes very strik-

ing changes. The fat disappears, and there is an increase of the nucleated red blood corpuscles (lymphoid marrow) or there is an increase of the large cells with single large nuclei—myelocytes—which, with the large number of leucocytes gives to the marrow a pruriform (pyoid) appearance, like the “core of an abscess” (Osler). The enlargement of the *lymphatic glands* is often sufficient to cause actual deformity. It is more perceptible in the cervical, axillary, mesenteric and inguinal groups. The glands may be soft or hard, of varying size and shape, discreet or agglutinated. The hyperplasia may involve the lymphatics at the base of the tongue, Peyer’s patches, the solitary follicles, and those of any organ of the body. The liver and kidneys may become enlarged from diffuse leukæmic infiltration, and the former especially, but the kidneys as well, may be the seat of distinct leukæmic growths, presumably the result of an aggregation of leucocytes which have left the capillaries. The *blood* is of a pale, pink color; the clots are soft, of a grayish-green, and from the enormous excess of leucocytes closely resemble pus. Its alkalinity and specific gravity are lowered, while the fibrin is increased. After death, octahedral crystals (Charcot’s crystals) are found in the blood, spleen, marrow and liver. There is much wasting of the body, general dropsy, and often traces of internal hæmorrhage.

Symptoms.—The symptoms at first are those of an anæmia: pallor of the skin and mucous membrane, headache, ringing in the ears, shortness of breath from any exertion, palpitation of the heart and anæmic murmurs, slight œdema, visual disturbances, epistaxis, and progressive loss of strength. The physician usually first sees the patient after the spleen has become materially enlarged.

In the *spleno-medullary* form, which is by far the more frequent form of leukæmia, the gradual and progressive *enlargement of the spleen* constitutes the most striking symptom. It extends downward and toward the right, often as low as the pubes and considerably beyond the median line. It can easily be felt; the inner edge especially is well defined, rather sharp in outline, and presents the characteristic notches. There may, or may not, be pain and tenderness on pressure. Gastric distress after eating and more or less shortness of breath result from pressure on the stomach or crowding-up of the dia-

phragm. The size of the organ may be temporarily increased after eating a full meal and diminished from an attack of diarrhœa or hæmorrhage. Shortness of breath is common, and is largely anæmic. Pulmonary œdema is not rare in the latter part of the disease, but such complications as pneumonia are infrequent. There may be a good deal of nausea, vomiting and diarrhœa, and occasionally intestinal hæmorrhage; ascites may result from the splenic enlargement. Leukæmic infiltration in the peritonæum may cause peritonitis. The pulse is usually soft, compressible, rapid, but rather full. Hæmorrhages, particularly from the nose and gums, are frequent. Œdema of the feet and anasarca arise from the enfeebled circulation. Retinitis may result from the presence of small leukæmic deposits or from hæmorrhage; deafness may be caused from hæmorrhage into the auditory nerve, and symptoms resembling those of Menière's disease have been described by some observers. *Fever* is present in most cases. It usually occurs at irregular and prolonged intervals; the temperature rises to 102° or 103°; there may be a chill and profuse, exhausting sweating. The *urine* has a specific gravity of 1.020 to 1.027, with increased excretion of nitrogen and, often, of uric acid. One of the most striking symptoms observed and as yet unexplained, is the occurrence of intense priapism, sometimes continued for a period of weeks. Coma occasionally results from cerebral hæmorrhage.

The *blood* demands especial study. Its pallor and thinness are at once noted. The microscope shows the enormous increase of white blood corpuscles. "The size of the white corpuscles varies in different cases, and also in the same case. Virchow has called attention to the fact that the smaller cells originate mainly in the lymph-glands, and are therefore especially numerous where the leukæmia is of a lymphatic type. The larger cells are referred mainly to the spleen and marrow. The marrow is also said to contribute certain extremely large nucleated cells, the dimensions of which considerably exceed those of the normal white blood corpuscles. It is not always possible to determine the origin of the white cells from their size. Ehrlich has succeeded in making out various forms of white corpuscles by staining. What are called 'eosinophilous cells' are especially increased in the blood of leukæmia. These are

colorless cells, the granules of which take a deep stain with acid pigments, but not with basic. Coincident with this increase of white cells in leukæmia there is almost always a considerable diminution in the number of red blood corpuscles. We also find an occasional nucleated red blood corpuscle in leukæmic blood, and sometimes also microcytes, poikilocytes and almost always a large number of 'granule masses' interspersed between the blood corpuscles" (Struempell).

Lymphatic leukæmia is a much rarer form of leukæmia. Its symptoms resemble those already described, but the affection shows a preference for young persons and runs a more rapidly fatal course than the spleno-medullary form. The glandular enlargements are usually of moderate size and involve the superficial groups. There is rarely much pain or tenderness in the affected glands, but they usually cause pressure symptoms, as œdema from pressure upon the veins or dyspnœa from pressure upon the trachea or bronchi. Splenic enlargement is almost always conspicuous. The histological character of the blood differs from the spleno-medullary form in that the increase in the colorless elements is never so great and consists almost wholly of lymphocytes. There are few eosinophiles and nucleated red corpuscles, and no myelocytes.

Diagnosis.—The presence of anæmia with enlargement of the spleen or of the lymphatic glands is presumptive evidence of leukæmia; but since the clinical history of this affection closely resembles Hodgkin's disease and splenic anæmia, microscopic examination of the blood alone can render the diagnosis positive. It is also necessary to differentiate between leucocytosis and leukæmia. "For this purpose the relative proportion of red to white corpuscles is of no value except in extreme cases, since a proportion of one leucocyte to twenty red corpuscles has been found in leucocytosis. In leucocytosis the total number of red blood corpuscles is usually relatively normal, in leukæmia it is markedly diminished. In leucocytosis, according to Ehrlich, there is a disproportionate excess of polynuclear leukocytes, which normally constitute three-fourths or two-thirds of the total number of leukocytes. It may be impossible from the examination of the blood alone to make a diagnosis of leukæmia in its early stage or when myelocytes are absent. The characteristics of the blood may vary from time to time.

A predominance of the large mononuclear forms is suggestive of a conspicuous affection of the spleen, while an excess of the small mononuclear forms indicates an affection of the lymphatic glands, and abundant myelocytes—myelæmia—if occurring, would indicate a conspicuous medullary or myelogenous leukæmia. According to Fränkel, the blood of acute leukæmia is distinguished from that of chronic leukæmia by a preponderance of large and small mononuclear leukocytes and an excessive diminution of the polynuclear variety. In chronic leukæmia there is an increase of all varieties in addition to the presence of myelocytes. The existence of changes in the bone-marrow is favored by conspicuous tenderness of the bones, although Litten denies the diagnostic importance of this symptom" (Wood and Fitz).

Prognosis.—The disease is usually seen in the chronic form and then terminates fatally, in the great majority of cases, within two, or at most three, years. Exceptions are to be noted, for occasional recoveries are claimed; again, the duration may exceed the limit of time given. Periods of temporary improvement are not unusual. Acute cases of the lymphatic form often run a rapid course, death occurring in a few weeks. In the chronic type the duration largely depends upon freedom from complications, absence of high fever, hæmorrhages, exhausting diarrhoea and dropsy. Death is likely to result from progressive exhaustion, often hastened by pulmonary œdema. Pneumonia developing, a rapidly fatal termination is quite sure.

Treatment.—So far, all treatment employed has proved futile. The general plan outlined under progressive anæmia, unsatisfactory as it is, must be followed. The persistent use of ARSENIC promises most. All operative measures so far suggested are worse than useless; neither has any good been accomplished by transfusion of blood, inhalation of oxygen, or other special measures.

PSEUDO-LEUKÆMIA.

Pseudo-leukæmia, Hodgkin's disease, splenic anæmia, general lymphadenoma, adenia, is very closely related to leukæmia, presenting hyperplasia of the lymph glands and splenic enlargement, with anæmia, but there is only slight increase, or no increase, of white blood corpuscles.

Ætiology.—Nothing definite is known of the essential cause. Some writers think pseudo-leukæmia of infectious origin, others consider it due to local irritation, while still others attempt to establish a connection with syphilis and malaria. In the majority of cases the approach of the affection is insidious and without apparent cause. It is a disease of the young rather than the aged, and three-fourths of the cases have occurred in men.

Morbid Anatomy.—There is enlargement of the lymphatic glands, now hard and firm, then soft. At first the individual glands are well defined and freely movable; later they form large agglutinated masses, covered by firm, dense tissues. Inflammatory adhesion to the overlying skin is common; or the investing capsule may be broken, allowing the invasion of contiguous structures. While superficial glands occasionally suppurate, there is in the main slight tendency, especially in the deeper glands, to suppuration or degeneration. Upon section the tumor proves to consist of a nodular mass of adhering glands of a grayish or grayish-red surface; the microscope shows extensive proliferation of lymph cells wholly obscuring the reticulum. Usually the superficial glands (cervical, axillary, inguinal) are attacked; sometimes intervening groups escape; again, the deep-seated glands, especially the mediastinal and retroperitoneal, suffer most. Enlargement of the *spleen* occurs in three-fourths of all the cases studied, but it seems slight when compared to the splenic enlargement of leukæmia. The marrow of the long bones may be rich in lymphoid tissues. Lymphoid growths are found very often in the spleen, the tumors there frequently reaching the size of a walnut; they also occur in the liver, kidneys, lungs, tonsils and follicles, at the root of the tongue, in the intestines and upon the skin; they may invade the spinal canal and give rise to paraplegia.

Symptoms.—The onset of the disease is almost always gradual, attention being first called to a glandular enlargement, usually of the cervical glands on one side, the nature of which is not easily determined. More rarely the deep-seated glands are involved first, and then pressure symptoms are the first indication of the trouble. The enlargement increasing, a tumor of considerable size forms, often producing startling deformity by obliteration of the neck and in extreme cases such extension of the

growth as to lie over the clavicle, sternum and shoulder. Gradually, and with varying rapidity, other glands, as the axillary or inguinal, or the deep-seated glands, are involved. General health in the beginning is not affected, but after a time symptoms of anæmia develop. The patient complains of palpitation of the heart, and examination demonstrates the presence of cardiac murmurs. Shortness of breath results from anæmia or from pressure upon the trachea, sometimes from pleuritic effusion. Fever is noticed in the majority of cases, even early; it may be of an irregular type or continuous, with evening exacerbations. The urine may be albuminous. Enlargement of the spleen is not unusual; more rarely the thyroid and thymus gland is involved. Bronzing of the skin, intense pruritus, secondary lymphatic tumors of the skin, and delirium and coma are among the less frequently observed symptoms. The blood presents no characteristic changes, but should nevertheless be frequently examined, since cases of this sort may assume the characteristics of a true leukæmia. A peculiar feature of the glandular enlargements is the fact that towards the end of life, and often during the febrile attacks, they diminish very materially.

A great variety of symptoms is caused by pressure of the enlarged glands upon adjacent structures or organs. Thus the cervical tumor may give rise to dysphagia from pressure upon the pharynx and œsophagus; to dyspnoea from pressure upon the larynx and trachea, with paroxysms of asthma if the bifurcation of the trachea is involved; to disturbances of the heart, if the vagus is interfered with. Involvement of the bronchial glands often causes distressing dyspnoea; of the axillary glands, swelling of the arms; of the abdominal glands, ascites and jaundice from pressure upon the portal vein and bile ducts; of the inguinal glands, œdema of the lower extremities. Pressure upon the superficial veins may result in local œdema, dilatation of the vein, and ulceration of the skin. Hoarseness is caused by pressure on the recurrent laryngeal; inequality of pupils from pressure on the cervical sympathetic; deafness from growth of adenoid tissue in the pharynx.

Diagnosis.—In the early stage of the disease it is important to determine, if possible, the nature and cause of the glandular enlargement. Tubercular adenitis especially must be considered.

The following points are to be remembered: The tubercular affection occurs oftener in the young; the disease is limited to a single group and to one side (left cervical, left axillary), and may exist there for years without involving other groups; the affected glands are less freely movable than in pseudo-leukæmia; the bunches are small, knotted together, and are prone to soften, degenerate, suppurate, while in Hodgkin's disease suppuration occurs rarely, and then only in large and usually in superficial masses. Tubercular adenitis, furthermore, is more likely to involve the submaxillary glands than those of the anterior and posterior cervical triangles. The constitutional symptoms and the history of the case may afford valuable information. If the glandular enlargement is moderate and on one side, excision may be performed, giving an opportunity for conclusive histological examination of the structures. Absence of anæmia and of pressure symptoms, with persistency of the tumor, without extension, points toward *benign* lymphoma. If the lymphomata are leukæmic in character, examination of the blood will determine that fact.

Prognosis.—Recoveries are rare, and while in the early stage the patient should have the benefit of the doubt, little encouragement can be given after the disease has reached an advanced stage. Extensive involvement of the deep lymphatics adds much to the gravity of the outlook. In acute cases, where there is rapid involvement of successive groups of glands, death may occur in a few weeks, certainly in a few months. In chronic cases the duration of the disease is several years, and not infrequently the tumors cease to grow and even diminish materially with temporary improvement of the constitutional condition. In very exceptional cases they may disappear. However, profound cachexia and anæmia, followed by dropsy, eventually develop, and death occurs from exhaustion or from the mechanical effects of compression, possibly from hæmorrhage or coma.

Treatment.—If the patient is seen early, while the enlargement of the superficial glands is still small, excision should be performed promptly; later on, an operation is worse than useless. Constitutional treatment is that of anæmia and leukæmia. Arsenic is by the highest authorities credited with being the only remedy capable of promoting absorption of the lym-

phomata. Emphasis is placed upon giving the drug in doses of one-fifteenth of a grain, or larger, of arsenious acid three times daily, for a long time, with, of course, the usual precautions against the development of toxic effects. Injection of arsenic directly into the gland is also recommended. "Each day there should be injected into a gland not before treated a mixture of equal parts of fresh Fowler's solution and of a two per cent. solution of carbolic acid in water. The first dose should be four drops, and an additional drop should be added daily until twenty drops are reached or toxic symptoms are produced. There may be no immediate disturbance, or there may be local pain for some hours afterwards. Cutaneous inflammation or abscess may follow, or temporary enlargement of the gland and œdema. As an immediate result of the treatment the patient may suffer from a bad taste in the mouth, a burning in the throat, thirst, loss of appetite, nausea and vomiting, diarrhœa, abdominal pain, and jaundice. The temperature and pulse may rise. These symptoms demand temporary cessation of the treatment. If the glandular swelling return, a renewal of the treatment is indicated" (Wood and Fitz). Struempell claims to have seen apparent benefit from associating with the arsenic treatment, internally, inunctions of iodoform (1 part to 15 of vaseline) over the tumor. Gowers and others recommend phosphorus when arsenic cannot be borne or has proved useless. The necessity of supporting the strength of the patient by all means at our disposal is evident; to this end cod-liver oil, if well borne, is exceedingly useful.

ADDISON'S DISEASE.

An affection characterized by a peculiar pigmentation of the skin, extreme debility, cachexia and, usually, (tubercular) disease of the supra-renal capsules.

Ætiology.—Addison's Disease is rare, particularly in America. It is seen in men at least twice as often as it is in women, and generally occurs between twenty and forty years of age. The ætiology is quite obscure. It is held by many that the disease is primarily an affection, usually tubercular, of the supra-renal

glands. These in a normal state are presumed to furnish a secretion or extract which is essential to normal metabolism; this function having been destroyed by disease, there is thought to result either a toxic condition of the blood or a profound general atony or apathy (Rolleston). Others hold that the real trouble lies in the nervous system, and rest their belief upon the frequent occurrence in Addison's disease of degenerative and inflammatory changes of the solar plexus. It is, however, evident that in this strange affection the supra-renal glands are diseased much oftener than is the solar plexus, and that the changes in the latter are neither characteristic nor present in a large number of cases. It is even admitted that cases of Addison's disease have occurred in which neither supra-renal capsules nor solar plexus were involved. It is thought that in some cases the disease followed injuries.

Symptoms.—Pigmentation of the skin is the most conspicuous symptom. Its seat is the Malpighi and the corium. It varies from a light yellow to a deep brown or even black, and in typical cases has the true greenish-brown, bronze tint. It is, of course, first noticed on the exposed parts of the body, the face and the back of the hands, and on surfaces naturally most pigmented (nipples, scrotum, penis); it commonly affects the mucous membrane (mouth, conjunctiva, vagina) and often the serous membrane. The sclera and nails, as a rule, escape, as may also the palms of the hands and the soles of the feet. Atrophy of the pigment is at times seen in patches (leucoderma). Pigmentation is absent only in very rare cases.

In many cases, before the appearance of pigmentation, gastric disturbances have begun to annoy the patient, and he may suffer severely, even early in the course of the affection, from nausea, severe vomiting and gastro-intestinal catarrh. Complaint may also be made of rheumatoid pains. More characteristic, however, than the gastro-intestinal disorder is the profound prostration which exists throughout the course of the affection and which is out of all proportion to the comparative mildness of the constitutional symptoms. This prostration involves both body and mind, not only rendering a sustained physical or mental effort quite impossible, but making even a slight exertion absolutely burdensome; even a trifling effort may be followed by panting, ringing in the ears and dizziness.

Anæmia, which by Addison was considered a highly important symptom, is not, according to later observers, prominent or severe. The pulse is small and rapid, and the action of the heart feeble. Fainting occurs often and from slight causes. The urine usually is normal; there may be polyuria.

Asthenia soon increases to an extent which forces the patient to remain in bed; his intellectual and physical powers continue to grow weaker, his voice loses its natural ring, and death eventually occurs from exhaustion or heart failure. In exceptional cases convulsions have been observed.

Diagnosis.—The diagnosis of Addison's disease depends upon the existence, simultaneously, of the typical pigmentation and the characteristic extreme debility. It is necessary to bear in mind that pigmentation of the skin may result from other causes, as disease of the liver, tuberculosis, cancerous or lymphomatous growths in the abdomen, melanotic cancer, exophthalmic goitre, pregnancy, disease of the uterus, or disease of the skin from irritation by dirt and vermin. Should a differentiation between these types of pigmentation become essential, close attention must be paid to its distribution and to the involvement, or freedom from involvement, of the oral mucous membrane.

Prognosis.—In rapidly progressing (acute) cases death may occur within a few weeks. Oftener the disease runs a chronic course and, with occasional periods of improvement, life may be spun out for two or three years. Exceptional cases are recorded where life was prolonged even ten years. It is admitted that the prognosis is practically hopeless, and reported cures are thought to rest upon an error in diagnosis.

Treatment.—Absolute rest in bed is essential in cases of profound asthenia with tendency to fainting. The diet must be nourishing and easily digested; milk is often kindly borne. Remedies likely to be of service are those suggested by the cachexia, anæmia and gastro-intestinal symptoms.

Of late the profession have been interested in the treatment of Addison's disease with the extract of the supra-renal capsules of animals, i. e. sheep and beef. Although the reports are somewhat contradictory, results have in the main been encouraging. Ten grains of the supra-renal capsule of beef in glycerine may be injected hypodermically each day, or the patient may

be directed to eat three times each day two uncooked adrenals of sheep or half a gland from a steer, or take five grains of the dried gland, three times daily in capsules. The gland may be eaten cooked, if desired.

Just how much, or how little, remedies acting under the law of similars are capable of doing, cannot be determined until more extensive clinical experience has accumulated. The following should be consulted: *BELLADONNA*. In acute cases, with much pain in the back and loins; tenderness in the epigastrium and hypochondrium, with much vomiting and characteristic diarrhoea and nervous symptoms.—*CALCAREA CARBONICA*. In chronic cases, with excessive muscular debility, headache, vertigo, fainting. Gastric catarrh, with epigastric and abdominal tenderness and tendency to constipation. Pressing pain in kidneys and loins. Scrofulous or tubercular tendency.—*NATRUM MURIATICUM*. Remarkable impairment of nutrition. Great mental and physical prostration; trembling of the legs; anorexia; loathing of meat; vertigo on rising from bed and trying to walk. Strumous diathesis. Periods of irritability, with general despondency.—*PHOSPHORUS*, according to Payr, when there is sickly yellow color of the face, with sunken features and eyes. Great exhaustion, coming on suddenly, with fainting. Headache, vertigo, sleeplessness, despondency, irritability; burning, cutting, pressing pains in the stomach; nausea and characteristic vomiting; diarrhoea or constipation. Weakness and lameness in the small of the back; weakness in the extremities; twitchings and spasms.

FERRUM, *IODIUM* and *ARSENICUM* should also be studied.

DISEASES OF THE THYROID GLAND.

GOITRE.

Goitre or hypertrophy of the thyroid gland occurs sporadically almost everywhere, and endemically in some parts of the world, especially in mountainous countries; in Europe it is endemic in Switzerland. It is not a very common disease in America. The statement is made that an unusual number of cases are seen in the strips of country bordering upon the great

lakes, especially in Michigan. A residence of many years in that country makes me doubt the correctness of the statement.

It is not positively known what causes goitre, although many observers still hold that some quality in the drinking water is responsible for its existence. Heredity undoubtedly is a factor. The greater number of cases occur in women, especially in young girls at the age of puberty. This fact, together with the temporary enlargement of the gland which may often be seen during menstruation, has suggested a possible connection between the reproductive system and goitre.

Three varieties may be distinguished: *Parenchymatous* goitre, in which the substance of the gland is enlarged by new growth of follicles; these may undergo hyaline, gelatinous or colloid degeneration, masses of which occupy parts of the tumor (colloid goitre). The *vascular* form is due to dilatation of the blood vessels or to an excess of vascular tissue, with no new formation of glandular tissue. In *cystic* goitre the gland is occupied more or less extensively by cysts, often of large size, containing, usually, liquid contents; the walls of the cysts may, or may not, undergo calcification.

Symptoms.—Unless pressure effects are caused, which would be the case only in a tumor of considerable size, a person may have goitre for many years without observing a single unpleasant symptom; cases are not rare of old people who through life have carried a large goitre without ever experiencing more than a trace of difficult breathing. The commonest pressure symptom is dyspnoea from compression of the trachea; less often there is difficulty of swallowing from compression of the œsophagus; narrowing of the pupil is occasionally seen from pressure on the sympathetic. Should the goitre pass beneath the sternum, pressure on the veins may result in fatal thrombosis. Exceptionally death occurs suddenly, probably from sudden compression of the trachea or from paralysis of the vocal cords.

Prognosis.—In young people, especially in young girls, goitre may get well of its own accord, provided there is no degeneration of the gland; in the far greater number of cases it exists through life.

Treatment.—In deference to the possible connection between drinking water and goitre, it is well to insist upon change of

drinking water or at least upon boiling the water used for drinking purposes. It is not denied that cures have been affected by taking these precautions. If degeneration of structure has taken place, the case should at once pass into the hands of the surgeon. No degeneration of structure existing, medical treatment may be attempted, and with the reasonable hope of accomplishing a cure.

SPONGIA TOSTA has for centuries had a reputation for curing goitre; this it still maintains among homœopaths. Cures have been reported with a large range of attenuations, but the low triturations of the burnt sponge are probably preferable.—IODINE has probably cured more simple goitres than any other remedy, and is still a favorite prescription with many practitioners. It should be given in a low attenuation and for a considerable length of time. If used externally as well, it is best prescribed as an ointment; painting the surface with the tincture is useless.—CALCAREA CARBONICA is highly recommended by Proll, Ebstein, and others, and acts best when there are present characteristic constitutional indications with evidence of malnutrition and general tendency to glandular enlargements. It is claimed that even in cystic goitre excellent results have been obtained from its exhibition, particularly when prepared from the egg-shell.—PHYTOLACCA. According to Lilienthal and others it is indicated in "nodulated goitre; glands of the right side of the neck swollen; jerking, shooting, lancinating pains, worse in damp weather and at night."

Treatment with the extract of the thyroid gland is becoming fashionable; von Bruns, of Tuebingen, reports a series of cases in which excellent results were obtained. To adults he gives ten grains of the fresh thyroid, once each week; to children, five grains. Injections, deep into the gland, of twenty to thirty minims of a five-per cent. watery solution of carbolic acid have been used with good success by Haven, of Chicago. "Usually it causes a contraction and a hardening of the connective tissue of the tumor, and a gradual lessening of the blood supply, and in the course of eight or ten weeks a complete disappearance." The injection causes slight pain, but is followed by some dizziness which, however, soon disappears.

Electricity may be employed to advantage; in fact, in many cases it has proved the most satisfactory method of treatment.

A galvanic current of from five to fifteen milliampères may be passed through the tumor; or the cathode may be placed on the tumor and the anode in the auriculo-maxillary angle; or electrolysis may be used. The latter, according to Walling, is performed as follows: The parts are washed and may be injected with cocaine. Place a large anodal pad on the shoulder, or near by, and thrust one or more needles boldly into the tumor, until the insulation is beneath the skin. Gently turn on the current until you get five, ten, or even more, milliampères; let it run for from two to five minutes, and the operation is over for that time. The cathodal needles must be held in place, or their weight will cause them to fall out. If the tumor is dense and very unyielding, rendering the introduction of the needles difficult, push them through the skin, turn on the current, and then press them in as far as you wish. Repeat the operation in five or seven days, but in another place; it is free from danger and causes but little pain.

EXOPHTHALMIC GOITRE—BASEDOW'S DISEASE— GRAVE'S DISEASE.

An affection characterized by acceleration of the pulse, hypertrophy of the thyroid gland, and exophthalmus.

Ætiology.—The disease is not peculiar to any climate or country, nor does it occur with unusual frequency in countries where goitre is common. It is seen much oftener in women than in men, rarely begins before the twentieth or much after the thirtieth year, and is not infrequently seen in several members of the same family. It very often appears closely connected with profoundly depressing influences, such as violent grief, worry or fright. As yet, its essential cause is not known. Many consider it of purely neurotic origin; in support of this view emphasis is placed upon its close relation to profound emotions and moral influences, the well developed neuropathic tendency (hysteria, epilepsy, etc.) which is unmistakable in families who furnish several victims, and the absence of clearly defined lesions. On the other hand, in several examinations after death the medulla oblongata was found the seat of structural changes, and this fact has suggested the medulla oblongata as the possible cause of the mischief. The most popular

theory at present is that first advocated by Mœbius (1891), who considers Grave's disease the result of a toxæmia arising from morbid activity of the thyroid gland. The antithesis existing between exophthalmic goitre and myxœdema, which yet clearly shows that the morbid action expends itself in the same channels; the fact that the extract of thyroid gland in overdoses, when given in health or for myxœdema, often produces symptoms of exophthalmic goitre; and the occurrence of both affections in the same families, with the occasional temporary improvement from removal of the thyroid gland, are plausible arguments in favor of the teaching of Mœbius.

Symptoms.—The disease is essentially slow and deliberate in its onset and chronic in its duration. Exceptions occur in which the onset is sudden and the course very rapid. Such is a case related by von Graefe, where a young man, laboring under terrific sexual excitement, struggled for a half hour to gratify his passions, and then fell into a state of corresponding exhaustion; on the next morning there was noticeable protrusion of the eye-balls, and within a week the exophthalmus was terrible. Trousseau also relates a striking case, that of a woman of advanced years who was plunged into violent grief by the death of her husband. One night, when worn out by weeping and watching, she felt her eyes protrude to such an extent that she could not close the lids; this was accompanied with palpitation of the heart, sense of enlargement and throbbing in the anterior neck, and epistaxis which continued all night. Trousseau saw the patient four days later and found her a typical case of Grave's disease.

Usually, however, the disease comes on almost imperceptibly, the patient complaining of nervousness and disturbances of the circulation. There is much palpitation of the heart, with great increase of the cardiac impulse and throbbing and pulsating of the vessels, which is plainly noticeable in the superficial vessels; this tumultuous action of the heart is easily brought on or intensified by slight emotional excitement, and may be readily seen in the carotids and abdominal aorta; the heart sounds can often be easily heard at some distance from the patient. Cardiac hypertrophy is a common feature of long-standing cases. The pulse is rapid, at first from 90 to 100 beats per minute, but gradually increasing to 125 or 150, or more; it is quickly and

immensely accelerated by any excitement. Protrusion of the eye-balls follows soon, due to a material increase of blood and lymph in the orbit; hence the suddenness with which it may appear, the difference at different times in the degree of the protrusion, and the disappearance of the symptom after death. Permanent exophthalmos may result from large deposits of fat within the orbit. In extreme cases the eye-balls may be forced from the sockets. In the great majority of cases vision and pupils remain normal. Close study by specialists has developed some signs which are frequently found. Thus, at first a rim of white is seen above and below the cornea, and it is soon observed that there is less winking than in health. Von Graefe called attention to the stiffness of the upper eye-lid and its inability to follow the downward movement of the eyeball. Stellwag pointed out an enlargement of the palpebral aperture from retraction or spasm of the upper lid. Mœbius noticed a lack of convergence of the two eyes. Not all or any of these may be present. Pulsation of the retinal arteries was detected by Becker in five cases out of six. Corneal opacity and ulceration may result from exposure and great dryness of the parts and from trophic disturbance. Exophthalmus is usually bilateral and of like degree. Thyroid enlargement takes place, rarely with the appearance of palpitation, and then chiefly in the very acute cases; more frequently it develops weeks or months later. The swelling is smooth, firm, elastic, may involve one lobe, preferably the right, or the entire gland, and rarely attains the size of the common goitre. Knotted veins and distended arteries are often seen under the skin; the whole gland may pulsate; palpation detects a thrill, and auscultation easily perceives the *bruit de diable*. Osler attaches especial value to an involuntary, fine tremor, about eight to the second. Colloid and other degenerative changes may take place in protracted cases.

With the progress of the disease the patient becomes anæmic and feverish, loses flesh, and suffers more or less from nervous irritability. The disposition changes for the worse; peevishness and mental depression render it difficult to please; often a truly neurasthenic condition obtains; muscular tremors and weakness, with heaviness and weariness and lack of supporting power, make life trying. Hysteria, epilepsy and mania occur,

the latter particularly in cases which progress rapidly toward a fatal termination. Women suffer much from menstrual irregularities, often with a profoundly anæmic and chlorotic state. Vomiting and diarrhœa, especially the latter, occur throughout the course of the disease, and the intestinal flux may recur with great regularity at stated intervals. Many patients suffer keenly from throbbing in the arteries, and are subject to flashes of heat, followed by profuse perspiration. Passing erythema on the face, neck and shoulders, brought on from slight irritation, is frequently observed; "tache cérébrale" (Trousseau), a short-lived redness, from capillary engorgement, following a slight local irritation, such as passing the finger nail over the flesh, is common, but not of diagnostic value. The skin is often rough and dry; urticaria is not unusual; scleroderma and pigmentation, as in Addison's disease, occur rarely. Glycosuria and albuminuria are sometimes seen.

From extensive observation Charcot asserts that patients suffering from exophthalmic goitre show a great lessening of electric resistance, and Joffroy points out that if the patient be directed to hold the head down and look up without raising it, the forehead remains smooth instead of wrinkled, as it naturally would be.

Diagnosis.—No difficulty can be experienced when tachycardia, thyroid enlargement and exophthalmus are all present. In cases, however, which run a very tedious course, and in which the appearance of exophthalmos is delayed for years, or the enlargement of the thyroid gland is trivial and possibly wholly wanting, time is an important element in the diagnosis. Cases are on record in which the true nature of the disease was not recognized until after many years of observation and the final characteristic grouping of the cardinal symptoms.

The duration of the affection is indefinite, usually covering several years. Acute cases are exceptional and serious; yet recovery after a short illness has occasionally been put on record. Sometimes great improvement and even recovery take place after a case has run for six months or a year. If fully developed, the prognosis is unfavorable. Death occurs from asthenia, acute mania, or some intercurrent disease.

Treatment.—The general treatment consists of rest, which in severe cases must be absolute, good feeding, massage, absti-

nence from all stimulants, including tea and coffee, and of everything likely to worry or excite the patient. Many European writers advocate an occasional prolonged residence in a mountainous district, at an elevation of three to five thousand feet, especially in the Alps; American clinicians prefer the seashore. The excited state of the heart usually demands means for its relief; it is, however, generally admitted that, with the possible exception of *strophanthus* and *digitalis*, cardiac remedies accomplish little, if any, permanent good. The occasional use of an ice bag or of Leiter's coil over the heart or over the lower part of the neck and manubrium affords more direct relief, usually and promptly reducing the tumultuous action of the heart and the rate of the pulse; it is, however, only of temporary benefit. *Belladonna* in increasing doses has in some instances proved helpful. The treatment with thyroid gland (sheep) has been tested extensively, and alleged cures have been reported; but the concensus of opinion on part of the best clinicians is adverse to the claims made for it. Electricity has accomplished more than other special lines of treatment. Vigouroux recommends the faradic current. He applies it by means of a large anode to the back of the neck and a smaller cathode over the sympathetic ganglia in the front of the neck, "afterwards shifted to the motor points of various muscles of the face and neck, and still later replaced by a large cathode placed over the heart region and the sternum, a very strong current being used to the sympathetic, a weaker one to the heart region." Others prefer the galvanic current, placing the cathode just behind the angle of the jaw and the anode over the heart or upper sternum. The strength of the current should be sufficient to produce slight pain, the séances should be short, and the treatment continued for months. Surgical methods used consist of electrolysis, ligation of the thyroid arteries, and partial excision of the thyroid gland. Jaboulay makes an incision in the median line, separates the gland from the trachea, and leaves it exposed, covered by a simple protective antiseptic dressing; he affirms that the exposed gland rapidly shrinks in size. The wound is closed when the gland has returned to normal.

F. Park Lewis (Arndt's System of Medicine) considers *BELLADONNA* one of the most important remedies here.—*ARSENICUM* is

useful when there is much anæmia and emaciation; LYCOPUS VIRGINICUS is by Lilienthal and Hale credited with having afforded permanent relief of some of the most marked symptoms; SPONGIA, IODINE, SECALE, NATRUM MURIATICUM, AMYL NITRITE, CONIUM, and a score of other remedies, are suggested by various writers. The golden rule holds good which directs the exhibition of that remedy which is indicated by the totality of symptoms.

MYXŒDEMA.

A disease characterized by general swelling, resiliency and translucency of the integument, due to an overgrowth of the subcutaneous connective tissue and infiltration of the same with a gelatinous or mucinous substance, accompanied with mental sluggishness and atrophy of the thyroid gland. The affection is seen chiefly in women, rarely in children; it may occur in several members of a family and in connection with exophthalmic goitre; it may also follow goitre or coexist with goitre.

Sporadic or congenital cretinism is not myxœdema proper. Here the child is born dwarfed, thick-necked, short of limb, with protruding abdomen and a congenitally absent thyroid gland; the face is repulsive and abnormally large; the lips thick, the tongue clumsy, often protruding; the child is dull, even idiotic. In exceptional cases the thyroid gland is present and may even be materially enlarged. The characteristic myxœdematous condition of the skin is, however, wanting. Myxœdema proper occurs five or six times as often in women as in men. It is likely to be transmitted through the mother; one daughter may have exophthalmic goitre, while her sister has myxœdema. No clear connection has been established between the sexual or reproductive function and myxœdema.

There is marked increase in the bulk of the patient, with "filling up" or puffing of the face, neck and other parts of the body, and supra-clavicular swelling. The parts feel firm, inelastic, and there is no pitting upon pressure, since the swelling is the result of actual increase in volume and density of the subcutaneous connective tissue. There is no adhesion of the skin to the subcutaneous structures. The appearance and expression of

the face soon undergo a striking change. The face broadens out; the wrinkles are obliterated, thus destroying the natural expression; the features grow coarse as well as broad; the lips become thickened and the mouth heavy; the nostrils appear broad and flat; the tongue becomes large, clumsy, and sometimes assumes such proportions that it interferes with the swallowing of the saliva, which flows from the mouth in a constant stream. The color of the face changes to a chalky pallor, occasionally with bright red patches on the cheek. The skin is dry, rough, scaly and of brown appearance, and that of the hands especially is wrinkled and coarse. The nails become dry, brittle, atrophied, sometimes thickened, and frequently are lost. The hair undergoes similar changes, turns dry and coarse, and there is frequently loss of hair and of the teeth. The gait of the patient is now slow and cumbersome; she grows stupid and phlegmatic in action and speech. The disposition changes, and she becomes irritable, morose, suspicious. Headache frequently is persistent. Failure of memory, delusions, hallucinations, chiefly of sight, muscular weakness, with numbness, neuralgic pains here and there, and loss of patellar reflex develop in the course of time. The pulse and temperature usually are below the normal. There may be leukocytosis and hæmorrhage from the mucous membranes. The urine may contain albumin and even casts; exceptionally there is glycosuria. The functions of the heart, lungs and abdominal organs are not disturbed. The thyroid gland in the meantime undergoes extensive atrophy and may be converted into a small fibrous mass.

The progress of the disease is slow, covering a period of many years, not infrequently ten or fifteen years, death usually taking place from some intercurrent disease, oftener tuberculosis.

The so-called operative myxœdema results from the total, less often the partial, extirpation of the thyroid gland. It presents in the main the same train of symptoms, and because of its infrequency is of slight practical interest.

Treatment.—The patient should be kept at an even temperature and in a warm climate, on account of the habitual intolerance of cold. Frequent warm bathing and shampooing are highly beneficial.

The only direct treatment which so far has yielded positive results is the method introduced by Horsley and Murrey of injecting, subcutaneously, thyroid gland extract, modified later by Hector Mackenzie and Howitz to feeding the gland itself. This treatment has passed the experimental stage and constitutes one of the positive advances of modern medicine. The powdered gland or the glycerine extract may be used. The most approved way is to commence with one grain of the powdered gland, three times a day, gradually increasing the dose until the maximum dose of ten or fifteen grains has been reached. If there is positive improvement and the limit of the improvement has been attained, which must be determined experimentally, the treatment may be discontinued for the time being, to be resumed in moderate doses in order to maintain normal metabolism. One of the most reliable indications for the prompt resumption of treatment is a feeling of coldness on part of the patient. The evidence of beginning improvement lies in a loss of weight, increased warmth of the body, normal state of pulse and temperature, and brightening of the intellectual faculties. It requires some experience to determine when to discontinue treatment; physicians who lack this experience must not forget that the action of thyroidin is cumulative.

While ill effects are comparatively rare, they nevertheless occur; the tendency at present is to wholly ignore them. A temporary aggravation is not unusual, consisting of excessive nervous excitement, rapid pulse, great irritation of the skin, often accompanied with severe delirium. To this state, which is transient, the term "*thyroidism*" is applied. When it occurs, treatment must be stopped for a time. It has been shown that the juice of the thyroid gland may poison the heart, and in several cases death has resulted from the treatment.

Especially gratifying is the large number of cases of cretinism which under the thyroid gland treatment have been materially and permanently improved.

PART X.

DISEASES OF THE KIDNEYS AND
BLADDER.

Diseases of the Kidneys and Bladder.

DISEASES OF THE KIDNEYS.

MOVABLE KIDNEY.

Various degrees of mobility of the kidneys exist. There may be a displacement downward, just sufficient to allow recognition of the lower edge of the kidney by palpation (*palpable kidney*); or it may be possible to grasp the upper edge and to hold the kidney down (*movable kidney*); or the organ may be freely movable and displaced so as to appear as low as the middle line of the abdomen (*floating kidney*). Permanent fixation in an abnormal position is possible.

Ætiology.—A congenital predisposition to such a condition is based upon laxity of the supporting structures, as looseness of surrounding tissues, abnormal length of the renal artery, and laxity of peritoneal attachments. Usually movable kidney is acquired. It occurs from five to ten times as often in women as it does in men, is more frequent on the right side than on the left, and exceptionally may involve both kidneys. It is thought that the habit of tight lacing, as well as the relaxed condition of the abdominal walls from repeated pregnancies, accounts for the frequency of this accident in women. Wasting of fat about the kidneys; injuries; straining from heavy lifting; dragging down by tumors; displacements of the liver upward from great distension of the stomach, carrying the kidney with it, are each possible ætiological factors. Sometimes movable kidney is associated with neurasthenia, especially in chlorotic young girls, characterized chiefly by gastro-intestinal

disturbances and displacements of stomach, liver, intestines or uterus.

Symptoms.—Frequently the patient is wholly unconscious of trouble. There may be a sense of discomfort and dragging-down; or there may be experienced drawing pain in the abdomen, with shooting into the epigastric, lumbar or sacral region, or darting upward into the intercostal region, simulating neuralgia; again there may be colicky pain. Whatever the kind of discomfort felt, it often is brought on by a motion, change in position, stooping, or jar—as from riding—and is usually relieved by lying down and resting. In the cases associated with a neurasthenic state gastric disturbances, closely resembling nervous dyspepsia, are quite common, and to these are added symptoms of nervous irritability, such as pain in the head and back, moodiness and peevishness, paræsthesia, etc. A tendency to hypochondriasis in men and hysteria in women is often strongly pronounced, and it is on this account that such patients, always inclined to magnify even trifling ailments, should be kept in ignorance of the existence of a movable kidney. The association of movable kidney and dilatation or depression of the stomach is frequent. Glenard applied the term *enteroptosis* to the cases in which movable kidney is associated with dilatation of the stomach, displacement of abdominal viscera, nervous disturbances, and nervous dyspepsia. Occasionally there are observed paroxysms of severe abdominal pain, with nausea, vomiting, chills, fever and collapse, possibly with great sensitiveness to pressure and perceptible swelling in the region of the displaced kidney; these were first described by Dietl (*Dietl's crises*). Their cause is not clear; possibly they result from kinks or twists in the renal vessels. They often are accompanied by acute hydronephrosis. During these crises, called “incarceration symptoms” by Dietl, the urine usually is diminished in quantity, sometimes becomes bloody, and when there is pyonephrosis, it contains pus. The paroxysm having passed away, the urine again becomes abundant.

Diagnosis.—The diagnosis rests upon the recognition of a distinctive, firm, kidney-shaped tumor—easily escaping from the hand and readily pushed back into its normal position—either just below the edge of the ribs or toward the umbilicus or in the inguinal region. To recognize this tumor, bi-manual pal-

tion should be practiced, with the patient in the dorsal position and with head down and legs well drawn up, the physician's left hand in the lumbar region between the eleventh and twelfth rib, the right hand in the hypochondriac region, just under the edge of the liver, in the line of the nipple. If unsuccessful in this position, a change to the knee and chest, or some other, position may reveal the tumor. Not infrequently the patient knows from experience just what position to assume for the purpose of finding the tumor. An enlarged gall-bladder, a fecal mass, or pedunculated ovarian or uterine tumor or abdominal growth may be mistaken for a movable kidney.

The prognosis is favorable as to life. Recovery may take place, even alone from such improvement in general health as may restore vigor to relaxed supporting tissues. Or a case may continue indefinitely without giving rise to the slightest trouble, especially if the kidney eventually becomes fixed.

Treatment.—In the very exceptional cases where the kidney is displaced by a strain or similar injury and the physician is called at once, it is usually possible to replace the organ and by enforcing absolute rest in the recumbent position to permanently cure the case. Generally speaking, mechanical supports are indispensable. "The best bandage is made of silk elastic closely fitted to the whole abdomen of the patient, and prevented from riding up by means of straps of soft rubber tubing or similar material, one on each side, passing from back to front between the legs. Over the position of the dislocated kidney is sewed on the inside of the bandage a round pocket of soft chamois skin, left open above, so that a pad can be pushed into it and changed on occasion. Success depends very largely upon the skill of the maker in fitting and adjusting and the patience of the subject in enduring annoyance until habit has produced toleration." (Wood and Fitz).

Medication, by its effects upon the general health, is often of benefit, as in persons of a gouty tendency, in which case the diet also must be properly regulated. Surgical procedures are applicable only to exceptionally severe cases. They consist of removal of the kidney (nephrectomy), an operation which has made a bad record, and nephrorrhaphy (stitching the kidney to the posterior abdominal wall) first made by Hahn, and since then practiced successfully by many surgeons.

CONGESTION OF THE KIDNEYS.

Acute Congestion or hyperæmia of the kidneys consists of an active engorgement of the renal blood vessels without changes in the tissue of the kidneys. It may result from overexertion, from cold, from the ingestion of certain poisons (cantharides, turpentine, cubeb, copaiba), severe injuries, surgical operations and extirpation of one of the kidneys. It is characterized by diminution, sometimes suppression, of urine; the urine voided may contain blood, albumin and casts, with no material change in its specific gravity. Rest in bed, liquid diet and the application of the hot pack, for the purpose of bringing on sweating, are indicated, with such remedies—ACONITE, ARNICA, BELLADONNA, and others—as are suggested by the totality of symptoms.

Chronic Congestion or mechanical hyperæmia results from general or local causes. To the former belong chronic diseases of the heart and lungs with obstructed circulation; to the latter, pressure upon the renal veins from tumors, pregnant uterus, ascites, thrombi or cicatricial stenosis. The morbid anatomy is practically that of diffuse nephritis. "The organ is often somewhat enlarged, it feels firmer than normal, and shows, both on its surface and on section, a dark bluish-red color—cyanotic induration. The medullary substance is usually darker than the cortex. Under the microscope we see considerable dilatation and a tense fulness of the veins and capillaries. The parenchyma is normal, but in more advanced cases it may show a beginning of fatty degeneration of the epithelium, which is the result of the defective arterial blood supply. Interstitial changes are usually absent" (Struempell).

Symptoms.—The urine is scanty, dark, concentrated, of high specific gravity, and shows a sediment of uric acid and urates; it may be slightly albuminous, contain a few hyaline casts, and occasionally scattering white and red blood corpuscles, indicative of slight bleeding.

Treatment is of necessity directed to the primary difficulty; if the latter is incurable, the congestion continues to the termination of the case. Temporary improvement under the exhibition of appropriate measures is frequent.

ANOMALIES OF THE URINE.

Anuria means total suppression of urine; the term *oliguria* is used to express an abnormally small secretion of urine in the twenty-four hours. Both partial and complete suppression, more often the former, occur in acute nephritis. Anuria may also result from colds, especially in children; from acute poisoning by phosphorus, lead, cantharides, turpentine, mineral acids and irritants; it is a feature of collapse (shock, injuries in operations), occurs often in acute diseases as they approach a fatal termination (yellow fever, cholera, typhus, small-pox, etc.), is known to have followed the use of the catheter, and occasionally occurs in connection with hysteria. It may be obstructive, from blocking of the ureters by renal stone. In the absence of special complications the patient may live for many—eight to eleven—days, and present no symptoms of poisoning.

The treatment of obstructive anuria is wholly surgical. In other forms hot applications over the loins must be persistently kept up. Cupping is often of benefit. The bowels are to be kept open. Profuse sweating by the subcutaneous use of pilocarpine (gr. $\frac{1}{4}$ to $\frac{1}{3}$) is an important aid; the administration of the drug may be preceded by some stimulant, as gin in water or aromatic spirits of ammonia (thirty drops in water). Respiratory embarrassment counter-indicates the use of pilocarpine. The selection of the remedy depends largely upon the nature of the primary cause; thus, the entire series of remedies under nephritis, yellow fever, typhus, etc., may have to be consulted. The more important are: ARSENICUM, APIS, DIGITALIS, MERCURIUS, TEREBINTHINA, RHUS, ARGENTUM NITRICUM, CROTALUS, LACHESIS, PHOSPHORUS. ACONITE is to be especially considered in anuria resulting from exposure to cold; ARNICA, when due to mechanical injury; HELLEBORUS, APOCYNUM, APIS, when complicated with dropsy.

Hæmaturia.—Bloody urine occurs in connection with affections of the kidneys (active congestion, inflammation, stone, infarctions, new growths) and urinary passages (injuries of urethra or ureters from the passage of a stone, ulceration or malignant disease of the bladder, rarely in gonorrhœa); from injuries (fall or blow upon the back, catheterism); from acute poisoning with turpentine, carbolic acid, cantharides; in the

course of acute specific fevers (yellow fever, small-pox, malaria); in constitutional diseases (scurvy, purpura, etc.); from the presence of parasites (*filaria sanguinis hominis* and *Bilharzia hæmatobia*). Exceptionally no cause can be assigned or impairment of general health found; this applies especially to the occasional bleeding in young persons, at times undoubtedly vicarious, spoken of by Gull as "renal epistaxis."

The diagnosis rests upon the recognition of the presence of blood in the urine, which in appearance varies from a faint smoky color to a bright red or deep chocolate or porter color. Microscopic and spectroscopic examination may be necessary. The guaiacum test is reliable and simple; equal parts of old oil of turpentine, ozonized by exposure to light and air, and of the tincture of guaiacum are placed into a test tube; on the surface of this mixture an equal part of the urine to be tested is floated. In the presence of hæmoglobin there is formed a bluish-green ring which soon assumes a beautiful blue. If the hæmorrhage comes from the *kidney*, the blood and urine are usually intimately mixed; the blood is more often clotted, and there may be moulds of the ureters or renal pelvis, especially if the hæmorrhage is copious and the flow somewhat impeded; the blood is dark, with a brownish sediment; often pain in the renal region; tube casts. If from the *bladder*, pain and uneasiness when passing urine; urine at first clear; blood appears toward the last; if the bladder is washed out, the water is blood-tinged at first, then gets clear; the reverse is the case if the kidney is the seat of the bleeding. If from the *urethra*, the blood escapes in drops and without reference to micturition. As a general rule, the bleeding is not severe or constant when hæmaturia occurs as a feature of inflammatory or infectious disease, but persistent and copious when from cancer or new growths generally.

Treatment embraces absolute rest, measures to keep the bowels open so as to avoid straining at stool, and the use of cold applications (ice-bags, cloths wrung out of ice-cold water). In renal hæmorrhage the hips should be raised high. If from the bladder and due to fissures, astringent injections often are helpful; if profuse, from the neck of the bladder, the introduction of a soft catheter, which is allowed to remain, is highly recommended. If the bladder is filled with clots, these may be

broken up by the injection of peroxide of hydrogen or of pepsin or papoid, and can then be discharged through the catheter. Keyes insists that the clots should be let alone. Injections of hamamelis, several ounces in equal parts of water, are exceedingly useful. Hamamelis, given by the mouth, in doses of from thirty to ninety drops of the fluid extract, and ergot, in three-grain doses, several times during the day, are often of great value in checking the bleeding. The following will prove serviceable: ACONITE. Active congestion; throbbing; local heat.—ARSENICUM. Urine dark, decomposed, contains coagula. Burning pain in kidneys and bladder. In the course of debilitating, infectious or malignant diseases, with restlessness, anguish, cachexia, and characteristic constitutional indications. (ARSENICUM HYDROGENISATUM is said to be especially useful in the renal hæmorrhage of Bright's disease.)—CANTHARIDES. Inflammation along the urinary tract. Constant and ineffectual desire to urinate; urine is voided drop by drop, with burning, cutting pain and great urging. Intense burning when voiding urine, with tenesmus continuing for some time afterwards. Hæmorrhage rarely copious. Urine contains mucous sediment. Hæmaturia from stone, with violent pains in the back, along the ureters into the bladder.—CHIMAPHILA. In gonorrhœa of long standing. Burning, pricking pain while urinating. Copious ropy mucous sediment.—CROTALUS and LACHESIS in low fevers and profoundly cachectic states, characterized by degeneration of the blood (LACHESIS: like charred straw).—IPECACUANHA. Constant faintness, nausea, prostration; bleeding is profuse.—LYCOPodium. In tedious cases; gravel or chronic catarrh; urine scanty, dark-red, with sandy sediment.—MILLEFOLIUM. Chilliness; must lie down; severe pain in the region of the kidneys. "The blood forms a sediment in the vessel like a bloody cake" (Raue).—PHOSPHORUS. In low fevers.—SECALE. Painless discharge of black blood; the result of kidney-disease; passive hæmorrhage of thin blood; blood deteriorated; feels cold all over, but objects to being covered; low fever; great prostration.—TEREBINTHINA. Acts upon the kidneys as CANTHARIDES acts upon the bladder. Burning, drawing pain in the region of the kidneys; urging and pressure in the bladder, extending upward toward the umbilicus and into the kidneys. Urine thoroughly mixed with blood; dirty, reddish-

brown or blackish. Coffee-ground sediment in the urine. In scorbutic conditions; in persons who have lived long in damp dwellings.

Consult also CALCAREA, CAMPHORA, COLCHICUM, EQUIRETUM, ERIGERON, MERCURY, NITRIC ACID, SULPHURIC ACID, UVA URSI.

Hæmoglobinuria.—A condition of the urine characterized by the presence of the coloring matter of the blood, few, if any, corpuscles being present. The coloring is due to the presence of methæmoglobin; if present in small quantity, it gives to the urine a smoky color; if in large amount, the urine appears red, brownish-red, or blackish. The urine may contain albumin and sometimes hæmatoporphyrine; if the latter, it gives to the secretion the odor of fresh meat. The essential feature is a separation of the coloring matter of the blood from the blood corpuscles. This occurs in severe infectious diseases (especially in scarlet fever, erysipelas, typhoid fever, malaria) or in poisoning with carbolic acid, naphthol, corrosive sublimate, potassium chlorate, arsenuretted hydrogen, pyrogallie acid, and mushrooms. It may also result from the introduction into the veins of foreign blood or serum or from a burn. It occasionally occurs as a disease among new-born infants, even in epidemic form. The diagnosis rests upon the presence in the urine of blood pigment and the absence of blood corpuscles.

Paroxysmal hæmoglobinuria, i. e. hæmoglobinuria occurring in distinct paroxysms of varying duration, from a few hours to a day, or two, is seen usually in male adults, especially in those suffering from syphilitic or malarial poisoning. The paroxysms are usually excited by mental or bodily exhaustion, exposure, or getting hands or feet wet. They are preceded by chill and fever, the temperature rising to 103° or 104°; exceptionally the temperature is subnormal. There may be vomiting and diarrhœa. The patient experiences pain in the back and hips, sometimes with a sense of constriction in the chest and with labored respiration. The urine has the characteristics already described, and may be albuminous on the start and after the attack of hæmoglobinuria has passed off. There may be general pallor of the skin, with blueness of the finger-tips, jaundice, urticaria, or circumscribed œdema. The attack fre-

quently yields with copious sweating, and is likely to be followed by exhaustion. The affection is chronic, not fatal, and may disappear without treatment.

Treatment of hæmoglobinuria is unsatisfactory. External warmth is both grateful and helpful to the patient. Chrostek claims that amyl nitrite occasionally aborts or prevents an attack.

Albuminuria.—As the term is here used, it refers to the presence of serum-albumin in the urine. Whether, or not, such a condition must always be considered a pathological state is as yet an open question, for while in health only water and salt should escape from the blood, it is well-known that albumin in varying amounts may be present in the urine of persons who are in good health; hence the recognition of so-called *physiological* or *functional* albuminuria. This is commonly observed in young persons, especially in boys, particularly when they are rather anæmic, languid, poorly nourished, and of a neurotic tendency. In such cases albumin may appear in the urine and disappear at certain hours of the day. The amount varies; it usually is small, is likely to be increased from exertion of any kind and after eating, and disappears when resting. Such cases may wholly recover in the course of time, or they continue indefinitely, with more or less disturbance of the general health and evidence, finally, of a pathological condition. In other cases, including adults, albuminous urine is seen regularly after a meal, especially when the food is rich in albuminous substances (egg, cheese, pastry, etc.); violent prolonged exertion may have the same effect. Again, albuminous urine may be of daily occurrence when there is neither appreciable cause nor failure of health. The albuminuria of pregnant women may also be considered physiological.

It is evident that in many instances extreme care must be exercised in properly estimating the importance and meaning of this condition. This applies particularly to examinations for life insurance; here the responsibility of the medical examiner is very great, since he may injure the company by recommending the acceptance of a poor risk or do serious harm to an applicant by attaching undue importance to a condition which is but transitory. The terms *dietetic*, *cyclic*, *paroxysmal* and *intermittent* albuminuria explain themselves.

Albuminuria is present in febrile conditions, in diseases characterized by changes in the blood (scurvy, purpura, etc.), in chronic poisoning with lead or mercury, in anæmic states, syphilis, and in various affections involving the nervous system, as epilepsy, apoplexy, tetanus, delirium tremens, injuries to the head; it is also associated with exophthalmic goitre. The most serious form, however, is the albuminuria of renal disease, whether this be a mere congestion of the kidneys or acute and chronic Bright's disease, suppurative nephritis or degenerative disease of the organ.

Albumin may also find its way into the urine as the result of conditions in which the kidneys are not at fault. Thus, albuminous urine may be due to the formation of pus anywhere in the urinary tract, or to the presence of blood, lymph, semen or fragments of tumors. In renal albuminuria the albumin is evenly distributed throughout the urine, and casts and renal epithelium are present; in other forms the percentage of albumin is frequently much higher at the bottom than at the top of the vessel, and is in direct proportion to the amount of pus, etc., present; microscopic examination shows the blood, pus corpuscles and other sources of albumin. Both forms may occur in the same patient.

Tests for Albumin.—Clifford Mitchell (Manual of Urinary Analysis) gives the following directions: *Acetic acid test.*—Filter the freshly voided urine into a tall, narrow test-tube through three thicknesses of filter paper, until the tube is three-fourths full. Carefully wipe the outside of the tube until it is clean and bright. Hold the tube up to the light and see that both tube and urine are entirely clear and transparent. Boil the upper stratum of the urine in an alcohol lamp flame, inclining the tube over the flame so that the latter heats about half an inch from the surface of the liquid. Boil thoroughly for thirty seconds, removing from the flame whenever the urine threatens to boil over, but do not boil the lower half of the urine at all. Add three to six drops of a 20 per cent. solution of acetic acid to the boiling urine. Shake to and fro gently until acid and upper stratum of urine have thoroughly mixed, then boil again, say, for thirty seconds. Hold up the tube against a dark background or below a window-sill of a north-window or any window where there is no direct sunlight. If albumin is pres-

ent, the upper quarter or third of the contents of the test-tube becomes distinctly turbid. If *much* albumin is present, the whole upper third or half of the urine is milky and flocks soon begin to fall. If a *moderate* amount of albumin is present, the upper quarter or third is cloudy. If a *small* amount of albumin is present, a more or less distinct turbidity is seen, not perceptible when the tube is held up to the light. If no albumin is present, the upper, heated and acidulated portion of the urine will resemble the lower in appearance. If the urine be of deficient acidity, it will become cloudy when heated from precipitation of earthy phosphates. The addition of six drops of acetic acid and gentle shaking to and fro will usually dissolve the phosphatic cloudiness, and the urine becomes *nearly* clear when albumin is absent, but *more cloudy still* when albumin is present. If after boiling a cloudiness appears, which seems to disappear when acetic acid is added, but after further boiling a cloudiness in the upper portion is again plainly seen, a plain trace of albumin is present which was not seen at first, owing to the phosphatic cloudiness. A ring-shaped coagulum of phosphates remaining half-way down the tube must not be mistaken for albumin. The coagulum of albumin is always in the *upper* part of the tube. Acetic acid must be freely used if *freshly voided* urine is tested, if the urine is strongly alkaline and foams upon the addition of the acid; here acetic acid must be added, drop by drop, until the blue litmus paper, dipped in the upper quarter of the urine, is turned bright red; then boil again.

Heller's Test.—The urine is filtered as in the previous test; if not clear, shake the filtered urine with magnesia usta, and filter again; if not yet clear, add to the filtered urine half its volume of a ten per cent. solution of caustic potash and *boil*. It becomes cloudy from the precipitation of phosphates. Then filter. The filtered urine still being turbid, add to it a few drops of magnesian fluid (made by dissolving 1554 grains each of pure magnesium sulphate and ammonium chloride in twenty-seven fluid ounces of distilled water, with addition of three fluid ounces of ammonia water) and filter again. Then pour half-an-inch of pure colorless nitric acid into a test tube, hold the tube slightly inclined, and let an equal quantity of clear urine trickle down the inside of the tube. The urine floats

on the surface of the acid. If serum albumin is present, a sharply defined zone of whitish color will be observed at the point of contact between the acid and the urine, becoming more or less pronounced according to the amount of albumin present. If but little albumin is present, it may be necessary to hold the tube against a dark ground to see the zone. If no zone is seen, set the tube aside for half an hour, or more. A trace of albumin may then be seen which was not visible at first. The chief advantages of this test are: it is simple; it precipitates one five-hundredth of one per cent. of albumin; it precipitates various albuminous substances, but not phosphates, true peptones, or vegetable alkaloids. The following chances for error are present: If the test is carefully and slowly performed, the albumin appears in a distinct white *ring*, not in a generally diffused zone of haziness. A cloudiness *above* the point of contact, more diffused and spreading downward, is *not* albumin, but due to precipitation of urates, especially in urines of high specific gravity. A light cloudiness near the surface of the urine is not due to albumin, but to mucin (nucleo-albumin). In all urines a transparent zone of color appears, violet, reddish or brown; this is not due to albumin, but to oxidation of the normal chromogens of the urine. Crystals of urea form if the urine contains three per cent., or more, of urea. A yellowish-white zone may be due to the precipitation of certain resinous bodies (cubeb, turpentine, copaiba, etc.) taken by the patient. If the mixture of urine and acid be shaken with alcohol, the resins will be dissolved without effecting the coagulated albumin. If blood is present, the albumin-ring will be colored brown-red; if bile, greenish or blue. If the nitric acid contains nitrous acid, bubbles will arise, even in acid urine, and may obscure the ring; if the urine is alkaline, bubbles will always be seen, even if the nitric acid is pure.

Heat and Nitric Acid Test.—Boil the clear urine in a test tube, and add one-tenth of its volume of nitric acid; the presence of albumin is shown by cloudiness, coagulum or precipitation. Cloudiness may be due to phosphates; these are dissolved on the addition of an acid. Persistence of the cloudiness indicates albumin.

Picric Acid Test.—Make a saturated solution of picric acid, six or seven grains to the ounce of boiling distilled water.

Float two inches of the reagent on a column of urine four inches deep. As far as the yellow color extends the coagulated albumin renders the mixture turbid, forming a contrast with the clear urine below. Albumin, peptone, mucin, urates, albuminose, kreatinine, vegetable alkaloids and piperazine are all precipitated, but are dissolved by moderate heat.

For other tests see special works on urinary analysis.

Prognosis.—The prognosis of albuminuria must rest upon repeated and accurate tests and a knowledge of the source and cause of the disturbance. In addition to what has already been said, the necessity of great caution in diagnosis and prognosis may be still further emphasized. It is evident that transient or intermittent albuminuria is much less serious than when persistent. The appearance of albumin in the urine, especially with casts, in a man in the prime of life, say, at forty years of age, is always serious. The tendency to renal albuminuria increases with advancing years.

Pyuria.—Pus in the urine occurs in pyelitis, pyelonephritis, tuberculosis or abscess of the kidneys, cystitis, urethritis, sometimes in leucorrhœa, and from rupture of an abscess (perinephric, peritonitic, or on the abdominal wall) into any portion of the urinary passage. Its presence in the urine always gives rise to albuminuria. The urine is yellowish-white or white, and generally of alkaline reaction and of ammoniacal odor. The sediment is gray, heavy, tenacious, ropy; casually examined, it resembles that of phosphates, but is whiter and not so dense. The supernatant fluid is turbid. The presence of pus-corpuscles and epithelium from the renal pelvis and the bladder is easily detected under the microscope. The treatment of pyuria is that of the primary disease.

Chyluria or Galacturiá is due to the flow of lymph into the urinary tract. The urine appears white and homogeneous, like milk; sometimes the presence of blood gives to it a pink color. Exposed to the air, a creamy layer, sometimes a firm mass like jelly, may form at the bottom of the vessel. Made alkaline, and then shaken with ether, the fat is dissolved and the urine appears clear. It usually is more or less albuminous and under the microscope shows molecular fat, oil globules, leucocytes, and occasionally red blood corpuscles. The disease is not infrequent in the tropics, where it is thought of parasitic

origin, i. e. due to the presence, in the lymph vessels, of the *filaria sanguinis hominis*; in the temperate zone it is rare, probably non-parasitic, and without special danger.

Lipuria or *Adiposuria* are terms used to describe the presence of fat in the urine (*lipaciduria*: presence of volatile fatty acids, as acetic or butyric acid, in the urine). The fat enters the urinary tract directly (as in fatty degeneration of renal epithelium, inflammatory destruction of perinephric fat-tissue, pus in pyonephrosis, etc.) or is wholly or in part eliminated by the blood (poisoning with phosphorus, chronic alcoholism, phthisis, etc.). The excessive use of fat in the food (as when taking cod-liver oil for medicinal purposes) or fat-embolism after fractures, diabetes and cancer of the pancreas are other conditions in which lipuria exists. The fat occurs in greatly varying amounts. It may require microscopic examination to detect the oil globules or they may be sufficiently abundant to be seen with the naked eye; again, there may be so much fat present that upon cooling of the urine it forms a mass resembling lard or tallow. Abundant lipuria suggests serious disease of the kidneys or cancer of the pancreas.

Lithuria.—Deposits of uric acid or urates, chiefly sodium, potassium and ammonium urates, occur frequently in persons enjoying good health; it is a common feature of inflammatory affections (pneumonia, rheumatic fever, etc.), especially when characterized by profuse sweating; it is persistent in gout and is closely associated with lithæmia or the so-called uric acid diathesis. It is seen in crystals or in amorphous masses when the urine has cooled in the chamber; the former macroscopically resemble sand or Cayenne pepper; the latter, fine brick-dust. The coloring is due to the presence of urinary pigments. It must be remembered that the presence of this sediment does not necessarily indicate excessive excretion, but simply conditions which favor ready deposition of the urates or uric acid.

A clear definition of what constitutes lithæmia or uric acid diathesis is not yet possible. Murchison's teaching that functional disturbance of the liver is the primary and chief cause is far from proved or accepted. It is thought probable that defective tissue or food metabolism, particularly in the nitrogenous elements, which may be closely connected with deficient oxidation and which is oftenest seen in large eaters and drink-

ers of lazy habits, gradually leads to the changes which are comprised under the term gout. Haig (1896) expresses his belief that uric acid is a cause of high arterial tension, headache, epilepsy, mental depression, paroxysmal hæmoglobinuria, anæmia, Bright's disease, diabetes, gout and rheumatism.

Oxaluria.—Oxalic acid occurs in the urine in combination with lime, forming oxalate of lime, and held in solution by the sodium dihydric phosphate. It is present in acid urine, and may be detected as octahedral or dumb-bell shaped crystals in urinary mucus or adhering to the sides of the vessel. The amount depends greatly upon the diet; thus it is largely increased after eating freely of tomatoes and rhubarb. It may alternate with urates or uric acid in the urine. The constant presence of oxalates is thought to be associated with a diathesis of which nervous dyspepsia, nervous irritability, mental and bodily depression, with a pronounced tendency to melancholia, are the constitutional symptoms; these are usually relieved by the administration, three times daily, of from five to seven drops of fresh nitrohydrochloric acid, aided by the exclusion of sweets and indigestibles from the patient's dietary. Oxalates, when in excess, may be deposited before the urine can carry them off, in which case a calculus is formed. Oxaluria also occurs in connection with gout, lithæmia, spermatorrhœa, diabetes. The chemical tests are somewhat complicated and belong to the laboratory.

Cystinuria.—Cystine, under the microscope, appears in hexagonal plates. The cause of its presence in the urine is not positively known. It occurs constantly and in varying quantity. It may form a smooth, yellow, translucent calculus, of crystalline fracture.

Phosphaturia.—Phosphoric acid in the urine invariably occurs in combination with bases, in the form of phosphates, some of which are always held in solution, never being found in the sediment, while others, under favorable conditions, appear in the sediment. The term *alkaline* phosphates is applied to those which are never found in the sediment; they are the phosphates of sodium and potassium. The phosphates which under certain conditions may occur in the sediment are called the *earthy* phosphates; they are the phosphates of calcium and magnesium. When the urine is acid, all these phosphates are

held in solution; when the urine is feebly acid, neutral or alkaline, the earthy phosphates appear in the sediment. The *triple phosphates* (ammonio-magnesium phosphate) is a product of decomposition of urine, resulting from the introduction of a bacterial ferment, as in cystitis, the ammonium carbonate of the urea uniting with the magnesium phosphate of the urine. Under the microscope the earthy phosphates consist of minute, pale granules in irregular patches; the triple phosphates appear as "fern-leaf" crystals. The free deposit of earthy phosphates does not prove an excess of phosphoric acid in the urine; this can only be determined accurately by carefully made chemical tests. The amount of phosphates is increased in wasting diseases, in meningitis, and in epileptic convulsions. The phosphatic diabetes of Tessier is characterized by increased excretion of phosphates, polyuria, thirst, emaciation, loss of flesh, and strength. Excessive excretion of phosphates occurs in some cases of neurasthenia; it is diminished in acute diseases and during pregnancy. Persistent alkalinity of urine and subsequent abundant deposit of earthy phosphates is a common feature of indigestion, especially when there is a deficiency of hydrochloric acid. The formation of phosphatic calculi is sought to be averted by the internal administration of boric and benzoic acid, with the view of thus rendering the urine acid and of enabling it to retain in solution the earthy phosphates present. A sediment of earthy phosphates disappears at once as soon as the urine is rendered distinctly acid.

Urobilinuria.—The presence of an abnormal amount of urobilin in the urine is indicated by a dark-red or brown color of the urine and by the formation of a yellow foam when shaken. It occurs in connection with internal hæmorrhage from the absorption of extravasated blood and in fevers and certain diseases of the liver. The presence of bilirubin and indican in high-colored urine suggests the probable presence of urobilin.

Indicanuria.—An excess of indican (indoxyl-sulphuric acid) in the urine indicates chiefly increased putrefaction of albumin in the intestine; it is therefore found in conditions where there is deficiency or absence of hydrochloric acid, in gastritis, cancer or ulcer of the stomach, in diseases which cause impediment in the peristaltic movements of the small intestines, as ileus and peritonitis; in diseases characterized by albuminous putrefaction

in some part of the body, as pleurisy with copious unhealthy exudation, fetid bronchitis, empyema, pulmonary gangrene, peritonitis with formation of putrid pus, etc., in cholera, Addison's disease, chronic phthisis, cancer of the liver, dysentery, typhoid fever, chronic suppurations, and certain diseases of the nervous system; also after the use of turpentine, nux vomica, creosote, oil of bitter almonds. The most convenient test is that of Jaffe: "Mix 10 cubic centimetres of strong hydrochloric acid with an equal volume of urine in the test-tube, and while shaking add drop by drop a perfectly-fresh saturated solution of chloride of lime, or chlorine-water, until the deepest attainable blue color is reached. The mixture should next be agitated with chloroform, which readily takes up the indigo and holds it in solution, and the quantity present may be approximately estimated according to the depth of the color.

If the urine contain albumin, it should be removed before applying these tests, otherwise the blue color often arising from the mixture of hydrochloric acid and albumin after standing may prove misleading." (Purdy.)

Melanuria.—Melanin may be present in urine either in solution or as a granular deposit. The urine, if normal when voided, on exposure gradually becomes dark and finally black; the urine may be dark when first passed. It is present usually, but not always, in melanotic tumors, and occurs also in malarial, wasting and inflammatory conditions. The discoloration of the urine becomes intensified upon the addition of sulphuric or hydrochloric acid. The addition of a few drops of a strong solution of perchloride of iron causes the appearance of a gray color "which is imparted to the precipitate of phosphates occurring at the time if more of the reagent be added, and which dissolves again in an excess" (Mitchell).

Acetonuria.—An excess of acetone in the urine is usually due to increased albuminous decomposition. It is found in tedious febrile affections, diabetes, some forms of cancer, in psychoses, inanition, and as the result of auto-intoxication. Its characteristic chloroform and acetic acid odor may be marked in both the patient's breath and urine, especially so in diabetic coma, in the gastric crises of diabetes, particularly in cases which were serious from the beginning, and in febrile affections of children. For tests consult special works.

Diaceturia (Diaceticaciduria).—Diacetic acid is found in diabetes, in some fevers, in wasting affections, and in infantile convulsions. Its presence in children appears to be of trifling importance, but in adults it is closely associated with approaching fatal termination, characterized by coma. Its relation to diabetic coma is especially striking, as shown by Jaksch, Mitchell, and others. A form of diaceturia, due to auto-intoxication, has been described (diacetæmia) characterized by vomiting, dyspnœa, jactitations and, in adults, coma and death, without other discoverable lesion. Mitchell gives the following test: To a few c.c. of urine add a strong solution of perchloride of iron, drop by drop, until the precipitation of phosphates ceases. This may be readily observed by letting the precipitate settle, after a few drops of the iron solution have been added, which it will do in about ten minutes. Filter, and to the filtered urine add more of the iron solution. If now a Bordeaux-red color is seen, another portion of the urine is boiled and similarly treated, and if this second sample give no reaction, suspect presence of diacetic acid. Confirm by treating a third portion of the urine with sulphuric acid, shake the mixture with ether, and draw off the ether. Test the ethereal extract with the iron solution as above, and if the Bordeaux-red color be obtained, which disappears on standing for twenty-four to forty-eight hours, diacetic acid is present, especially if acetone can be detected in the distillate.

Alkaptonuria consists of the presence of alkaptone in the urine, and, in a broader sense, of aromatic compounds. Alkaptone is an amorphous, brownish or yellow nitrogenous substance, first described by Boedecker. When treated with cold liquor potassæ it strikes a dark-brown color, the coloration preceding from the surface of the liquid downward. Urine containing it may be clear, but darkens on exposure. It has been found in the healthy and in those suffering from tubercular disease. All the aromatic substances may be mistaken for sugar, since they reduce Fehling's solution. They possess no special clinical significance.

Chyluria and *Glycosuria* have been considered elsewhere.

Casts.—To determine the presence of casts, urine should be allowed to stand for a few hours in a conical glass vessel. It is well to prevent rapid growth of bacteria in the urine by add-

ing to it thymol or some similar substance. The clinical significance of casts is great, for their presence not only indicates renal disease, but often much light is thrown upon the nature of the affection by the character of the casts found. Thus, hyaline casts, although not necessarily proving fixed renal disease, and at times absent in albuminuria, usually indicate albuminuria; they may also be present in cholera, jaundice, and in poisoning with alcohol and sulphuric acid. Blood casts warrant the presumption of renal hæmorrhage. Epithelial casts indicate that desquamation of the renal epithelium has taken place. White blood corpuscles are proof of the migration of these important constituents from the vessels. Fatty granular cells and fat drops result from fatty degeneration in the kidneys, and are significant in diffuse or chronic parenchymatous nephritis.

Hyaline casts are probably formed from coagulated albumin which has been eliminated from the kidneys. They are homogeneous, colorless, clear and glassy, soft, narrow and long, and sometimes broken off at one end, frequently straight, more often curved. They stain easily with carmine or gentian-violet; are dissolved by heat; resistant to acids. They frequently are covered with deposits of granular matter, blood corpuscles, etc., which have become attached to them. Blood casts sometimes consist of pure coagulated blood, making a perfect cast of the uriniferous tubule in which they were formed; oftener they consist of hyaline casts to which red blood corpuscles are densely adhering. Granular casts consist of hyaline casts covered with granular masses, or of coagulated masses of albumin, or of granules of hæmatoidin. The term *fatty* casts is used when the granules are large enough to be readily recognized as fat. They may be held within the adherent cells or constitute irregular globules of fat. *Epithelial* casts consist of pure renal epithelium or of hyaline casts to which epithelium has attached itself. Evidence of atrophy or fatty degeneration may be presented by them. They resemble swollen white corpuscles. *Waxy* casts are found in acute and subacute nephritis and in amyloid kidney; they are broad, yellowish, opaque, glistening.

URÆMIA.

A toxæmia, chiefly affecting the nervous system, which oc-

curs in the course of Bright's disease and is the result of prolonged interference with the secretion of urine, depending upon renal disease, or of obstruction to the outflow of urine. While the degree of poisoning may be said to correspond to the reduction in the quantity of urine voided, the essential feature is the retention of the urinary solids; thus, profound uræmia may develop when large quantities of urine are passed which is simply water, as is the case in renal cirrhosis. On the other hand, there may be prolonged diminution or actual suppression of urine without symptoms of uræmic poisoning, in which case it is reasonable to assume that vicarious elimination is taking place through the bowels or through the skin, or that the patient lacks in susceptibility to the action of the retained poisonous substances. Uræmia may also occur from impediment of the renal circulation or from extreme engorgement of the renal vessels due to compression, or in profound alterations of the blood. While of especial interest in connection with renal diseases, it may also be associated with cholera, angina pectoris, chronic endarteritis and pulmonary emphysema.

As yet, the specific cause of the symptoms produced is not clearly understood. There is no longer good reason to presume that uræmia is essentially uric acid poisoning, nor has it been satisfactorily demonstrated that the symptoms are caused, as was claimed by Frerichs, by the presence of carbonate of ammonia. Neither do the facts sustain Traube's theory that an acute localized œdema of the brain is the cause of the uræmic symptoms; it is noticeable that such an œdema, though at times present, is by no means a constant lesion and fails to explain many important and characteristic symptoms of uræmia. We must therefore be content to attach the responsibility to the retention of poisonous materials which should have been eliminated.

Symptoms.—The symptoms of uræmia present a large range as to intensity, rapidity of development, or immediate seriousness; hence the natural division into acute and chronic uræmia.

The milder forms are characterized by indisposition, disturbances of digestion,—as nausea, eructations, vomiting and diarrhœa,—headache, tendency to stupor, uneasiness, and occasionally slight twitching of muscles, especially of the face and extremities. Such cases may continue for a long time, with im-

provement finally, or may suddenly give way to more violent and threatening manifestations. The most striking symptoms are those experienced in the nervous system, and of these the most prominent is *convulsions*. These may be preceded by general malaise, restlessness and pain in the head, or they may come on abruptly. They bear a striking resemblance to the convulsions of epilepsy; even the epileptic "cry" may be present. In the majority of cases the convulsions rapidly succeed each other, the patient remaining unconscious during the intervals. Rarely single seizures are seen, usually beginning with contractions in one of the extremities, oftener the arm, rapidly invading the trunk, face and legs, with exaggeration of the convulsive action in one-half of the body. Again, the severe convulsive seizures may alternate with comparatively light attacks. Localized or Jacksonian epilepsy has been noted. During these attacks the temperature may be elevated to 104° or 106° , but oftener it is lowered, and after the attack it may rapidly drop to 95° , and even lower. *Uræmic amaurosis* is of frequent occurrence in such cases, although it may also be seen when there are no convulsions. It develops rapidly, the reaction of the pupils to light is rarely lost, there are no ophthalmoscopic changes, and it disappears after a few days. *Deafness*, also due to central causes, is not unusual, and in the majority of cases occurs in connection with stubborn headaches and other expressions of disturbance in the nervous system. There may be *coma* with or without convulsions. It may be associated with muscular twitchings, especially of the face and hands, and be preceded by dulness, stupidity, and constant headache, or appear without warning or suspicion of renal disease. In some cases a condition of profound general torpor persists for a long time, sometimes for many weeks, with furred tongue and foul breath. *Mania*, usually of a restless, subdued, talkative character, sometimes appears unexpectedly in persons seemingly in usual good health; *delusions*, more often of persecution, are occasionally seen. A strongly marked tendency to melancholy characterizes these cases. Other nervous symptoms are: headache, frequently occipital and extending into the neck, accompanied with dizziness, numbness and tingling in the fingers, cramps in the muscles of legs, particularly at night, annoying itching of the skin, and occasionally erythema. Of these, the

headache is especially persistent. *Local paralyses* (hemiplegia or monoplegia) are rare; they may occur in chronic cases of Bright's disease or follow a convulsive seizure. They do not essentially differ from the paralysis of organic lesion of the brain, and are associated with localized or diffuse cerebral œdema.

Gastro-intestinal symptoms of uræmic poisoning consist of vomiting and diarrhœa, sometimes the former alone. The vomiting is uncontrollable and evidently of cerebral origin; in some cases, however, there appears to be much irritation of the gastric mucous membrane from the presence of urea and carbonate of ammonia, which are readily detected in the vomitus. Diarrhœa may exist without vomiting; it may be associated with expressions of intense catarrhal, even diphtheritic, inflammation, with tenesmus and bloody stools; the stools also may contain urea and carbonate of ammonia, the result of an attempt at the elimination of poisonous material. The skin, especially on the face, particularly on the side of the nose, may show of this effort at elimination of urea. Schottin and later observers have found scales of urea coating the skin after the evaporation of the sweat in cholera patients. A uræmic *stomatitis* has been described, involving the mucosa of the lips, gums and tongue, with difficult, painful mastication and swallowing, copious flow of saliva, foulness of taste, and heavy, fetid breath. *Dyspnœa* is present in some cases. It is usually nocturnal, sometimes continuous, again occurring in paroxysms with noisy, stridulous breathing, closely resembling attacks of true asthma. Cheyne-Stokes breathing occurs with comparative frequency, even when there is no coma. In some instances this condition proves very stubborn, but recovery may take place. The pulse usually is slow, but becomes small and frequent with the appearance of convulsions; it is always hard and tense. Some writers describe a "uræmic chill" which appears suddenly with other symptoms of uræmic poisoning, with a great rise in temperature, followed by a corresponding fall.

Diagnosis.—The diagnosis rests upon the result of urinary examination. Cerebral hæmorrhage or tumors, meningitis, alcoholic intoxication, opium poisoning, infectious fevers, and other morbid conditions, may, and at times do, so closely

resemble uræmia as to render differentiation extremely difficult. Hence the necessity of frequently repeated and carefully conducted tests of the urine, even though there may be no history of diminution or suppression of urine; in the presence of oliguria or anuria the omission of this simple procedure would be inexcusable. For treatment see Acute and Chronic Bright's disease.

ACUTE BRIGHT'S DISEASE.

An acute diffuse inflammation of the kidneys, affecting the epithelial, vascular or intertubular structure, presenting a varied symptomatology and a large range of pathological changes. The following terms represent attempts to distinguish types of the disease: acute nephritis; acute catarrhal nephritis; acute diffuse nephritis; acute desquamative nephritis; acute parenchymatous nephritis; acute croupous nephritis; acute exudative nephritis; glomerular nephritis; glomerulocapsular nephritis.

Ætiology.—Acute Bright's disease may occur from exposure to cold; it is thought that this is particularly dangerous when taking place after a prolonged debauch. In many cases the responsible cause is the presence of some infectious material which reaches the kidneys through the circulation, and in the attempt at elimination is afforded the opportunity of exerting its specific action upon the renal parenchyma, the damage there effected depending largely upon the amount of poison introduced, the intensity of its action, the duration of its influence, the susceptibility and resisting power of the individual attacked, and the previous state of the kidneys. It is on this account that the clinical history of this affection, its duration and termination are so varied. Of the infectious diseases in the course of which renal complications occur as a special localization of the specific poison present, scarlet fever heads the list; nephritis here rarely shows itself at the beginning, but is frequent toward the end of the third week. Nephritis is common also in small-pox, especially of the hæmorrhagic type, and may be associated with measles, cholera, yellow fever, diphtheria, cerebro-spinal meningitis, erysipelas; it is less frequent in dysentery, chicken-pox, acute tuberculosis, septicæmia, syphilis, malaria, acute pneumonia, acute articular rheuma-

tism. It may result from poisoning with turpentine, cantharides, potash (especially chlorate, chromate and nitrate), carbonic acid, oxalic acid, mineral acids, phosphorus, arsenicum, corrosive sublimate. It may complicate pregnancy; the question is still open whether in such cases the mischief arises from the presence of some special poison or from compression of the renal veins. It is more frequent in primiparæ, and usually appears during the latter months of pregnancy. Acute nephritis may result from extensive burns and occasionally is associated with diseases of the skin, as acute pemphigus, pustular eczema and various chronic eruptions.

Morbid Anatomy.—In the milder forms the renal epithelium alone is affected. Examined with the unaided eye, the changes seen are trifling. They consist chiefly of moderate swelling and, on section, of a dim reddish-gray appearance of the structures when there is merely cloudy swelling, but grayish-white or yellow in case of fatty degeneration. Under the microscope the following epithelial changes are observed: *Cloudy swelling.* The cells are swollen, their contents granular and cloudy; the nuclei swell and eventually disappear. The epithelium of the cortical tubules shows these changes most decidedly, but they are present also in that of the glomeruli. It occurs commonly in the lighter form of nephritis found in connection with the acute infectious diseases. *Fatty degeneration* succeeds the stage of cloudy swelling or comes on independently. Fat-drops are seen in the cells of the uriniferous tubules and in the epithelium of the glomeruli; the tendency is to disintegration of the cells. Fatty degeneration occurs in acute infectious diseases and from the action of certain poisons, like phosphorus; also in anæmic conditions.—*Necrosis.* The nuclei of the cells disappear, and the cells themselves become large, clear, homogeneous flakes. Necrosis of the epithelium is found in acute infectious diseases and as the result of toxic action of poisons, like cantharides. All these changes may be found in the same kidney, at the same time, varying in degree. Restoration of the affected structures may take place, proceeding from such portions of it as have remained normal, but the tendency is to cell destruction and disintegration. In true nephritis these epithelial changes are present in an exaggerated form, with a strong tendency to desquamation, and there is, as its essential

feature, involvement of the interstitial tissue and of the vessels, with escape of fluid and cells from the wall of the vessels. Dilatation and swelling follow the exudation and coagulation in the interstitial connective tissue of the inflammatory fibrinous exudate. White corpuscles abound in the interstitial tissue and may be found within the uriniferous tubules. Hyaline casts prevail in large numbers. The vessels themselves are congested or compressed from the presence of copious inflammatory exudate. Hæmorrhagic effusion is common into the interstitial tissue, within the uriniferous tubules, or into the capsules of Malpighi. These changes may be localized or diffuse, and they determine the microscopic appearance of the parts. Thus, the kidney is large in proportion to the amount of the exudate; it is soft to the feel when there is considerable inflammatory œdema; it is red when hyperæmia is pronounced; pale, when there is marked anæmia; yellowish-gray, when there is fatty degeneration. On section, there is seen dilatation of the medullary substance; striation is obscured or largely obliterated. Spots, here of hyperæmia, there of fatty degeneration, elsewhere of anæmia, give to the kidney a mottled appearance.

The so-called glomerulo-nephritis, as frequently seen in scarlet fever, is characterized by degeneration and desquamation of the epithelium in the glomeruli only, with a condition of the vessels presenting the characteristic swelling and homogeneous change known as "hyaline."

Symptoms.—The onset of acute nephritis may be sudden, especially in cases arising from exposure to cold, and then dropsy may appear within a short time. When arising in the course of infectious fevers, its onset is more insidious, so that its existence, in many cases, is not even suspected; hence the necessity of frequent examinations of the urine in diseases likely to be complicated by nephritis. In some instances chilliness or rigors are the first symptoms noted; in children convulsions may mark the beginning; in others there is general malaise, with nausea and vomiting, moderate rise in temperature, and some puffiness about the face and ankles.

The *urine* of approaching nephritis is scanty, high-colored, albuminous, bloody, and contains tube-casts. Anuria sometimes occurs at the very first. In the great majority of cases

the amount of urine passed in twenty-four hours does not exceed fifteen to twenty ounces and may amount to only four or five ounces in the same length of time. Generally speaking, the diminution in the quantity of urine voided is in proportion to the severity of the anatomical changes which have taken place in the kidney. The presence of blood renders the urine smoky in appearance or of a deep porter-color; sometimes, but rarely, bright-red. Upon standing, a heavy sediment is deposited, containing red and white blood corpuscles, renal epithelium, epithelium from the urinary passages, hyaline casts, uric acid crystals, urates, etc. Albumin, in amount varying from $\frac{1}{3}$ to 1, or even 2, per cent., is present in many cases; this symptom, however, is fitful and irregular. The urine being acid, albumin is promptly precipitated upon boiling. The percentage of urea is high in any specimen taken, but the total amount for the twenty-four hours is greatly reduced, often to one-sixth of the normal amount. The specific gravity is high, 1.025, or more. The urine may be voided with a considerable sense of uneasiness and burning. *Dropsy* may set in within a day, or two, after the first symptoms of acute nephritis have been observed, or, as is frequent in infectious fevers, especially in scarlet fever, when the patient was thought to have entered upon convalescence from the fever. Puffiness about the eyes and ankles is usually noted first; this extends to the extremities, genitalia, and may invade the pleura and peritonæum. In some cases pulmonary œdema may occur; œdema of the glottis is a rare manifestation. In post-scarlatinal nephritis pleural effusions are common and excessive. The general rule applies that, the greater the diminution of urine, the more pronounced the dropsy. Dropsy is a prominent feature of post-scarlatinal nephritis, of the nephritis of pregnancy, and of nephritis from exposure to cold. In febrile cases, as a rule, dropsy is neither so prominent nor so serious. In some fevers, especially typhoid fever, hæmaturia and great scantiness of urine are frequently present. It must be remembered that even severe cases of nephritis may not present dropsy. *Uræmia* may occur at any time. When there is pronounced anuria at the very beginning, danger of uræmic poisoning is great, and severe symptoms, such as eclampsia, may then set in quite early. Usually, symptoms of uræmia develop later and do not

reach a high degree of intensity. In some instances the persistent vomiting from which the patient suffers is a manifestation of mild uræmia; the twitching, wakefulness and restlessness of such cases is due to the same cause. Delirium is likely to develop later, followed by stupor and coma. Uræmic dyspnœa is not uncommon. Such conditions are not rare in the nephritis of scarlet fever. Nevertheless, uræmia is the exception, and not the rule, in acute nephritis.

As the disease advances, digestion becomes somewhat deranged; there is loss of appetite, heavy coating of the tongue, gastric uneasiness, constipation, sometimes diarrhœa. Emaciation, general exhaustion and anæmia develop, and if the tendency of the patient is downward, there is a disposition to epistaxis and hæmorrhagic effusions beneath the skin. The skin assumes marked pallor, appears translucent, and preserves remarkable dryness, often stubbornly resisting all attempts to bring on moisture. The pulse usually is hard and full, with increased tension, slow at first, rapid later on. An existing tendency to cardiac hypertrophy, especially in hearty, rugged children, renders it necessary to keep close watch upon the condition of the apex beat and the accentuation of the aortic second sound. Changes of temperature are not pronounced; a moderate fever, with a temperature not exceeding 101° to 103° is, however, not unusual, particularly in cases presumably due to exposure. Hæmorrhagic retinitis and, exceptionally, papillitis are rare complications.

The so-called primary idiopathic nephritis, resulting from exposure to cold, is in the majority of cases sudden in its onset, and usually runs a rather rapid course. Mild cases recover in a few weeks, while those of a severer type, with violent nephritis, often hæmorrhagic in tendency, may terminate fatally in two or three weeks or, if they recover, get well slowly.

The nephritis of pregnancy comes on insidiously, with slight urinary disturbances, frequent micturition, dropsical swelling of the lower extremities, albuminous urine, and occasionally nausea and vomiting. Recovery takes place rapidly after the birth of the child, or eclampsia, an expression of uræmic poisoning, sets in during labor. The onset of the convulsions may be sudden; they are general, violent, frequently repeated, and followed by coma. The prognosis in such a case is bad for both

mother and child, death of the mother occurring in about one-third of all the cases, and death of the child in even a larger percentage.

Diagnosis.—The diagnosis rests upon the results of frequent and carefully made examinations of the urine. There may be much difficulty in determining whether we deal with an acute attack or with an acute exacerbation of a case of long standing; or the physician may be perplexed by the absence of albuminous urine, as occurs in exceptional cases, even with extensive dropsy; in the latter, examination of the urine should be made at brief intervals, and is then usually rewarded by the appearance of albumin in the urine.

Prognosis.—The prognosis in the great majority of cases is serious. It is most favorable in nephritis due to exposure or poisoning, unless the amount of poison injected is large. The mortality in young children, especially when associated with scarlet fever, and of the nephritis of pregnancy is high, about one-third of all the cases proving fatal. As a rule, the more prolonged the course, the more guarded must be the prognosis, because of the increased danger from complications, especially uræmic and cardiac. Favorable symptoms are: increase in the amount of urine voided; lessening of the percentage of albumin present; increase of the percentage of uric acid; lessening of the dropsy, especially disappearance of the dropsy by the end of the first month; satisfactory state of appetite, strength, and of the general condition. Unfavorable symptoms are: low arterial tension, low percentage of urea in the urine; uræmia; severe general dropsy; severe effusions into the serous cavities. Especially dangerous complications are: extensive hydrothorax and inflammation of the internal organs, as secondary pneumonia. If the dropsy persists beyond the end of the first month, with intense pallor and largely albuminous urine, the case promises to become chronic. At best, the course of the disease, though recoveries may take place under the most unfavorable conditions, is exceedingly erratic; what seems material improvement may again and again be interrupted by unexpected exacerbation of all the symptoms, thus leaving the most experienced practitioner in doubt as to the final outcome.

Treatment.—Absolute rest in bed is essential even in mild

cases, and must be enforced at once. The room should be well ventilated, kept at a uniform temperature, and every possible precaution be taken to protect the patient against being chilled or taking cold. To this end underwear of light wool or Canton flannel must be worn. The bed-covering should be just heavy enough to favor a moderate moisture of the skin without being oppressively heavy. The diet must exclude all articles of food likely to irritate the kidneys. Milk answers every purpose, and has long been considered the ideal food in nephritis. If for some reason the patient cannot endure an exclusive milk diet, it may be varied by allowing butter-milk, gruels (arrow-root, oat-meal, flour) or barley-water; in some cases chicken-broth may be added. Later, oat-meal or cracked wheat may be given in nearly solid form. Water may be drunk freely, and some writers advise that from five to six quarts of liquid be given daily if the stomach does not rebel. Hot or warm drinks are preferable; iced drinks are absolutely forbidden. Alkaline mineral waters may be used. Osler recommends a drink made by dissolving a drachm of cream of tartar in a pint of boiling water, to which may be added the juice of half a lemon and a little sugar. A very little weak red wine may be taken once in a while, if there is a craving for it. Repeated dry cupping over the kidneys is strongly urged by American clinicians, especially in the early stage; it seems of doubtful value.

The chief object of the general treatment is to prevent the retention of the urinary constituents in the body; hence, every effort must be made to increase the action of the skin and to keep the bowels open. It would be desirable to stimulate the kidneys by the exhibition of diuretics, were their use not counter-indicated by the irritation which these substances occasion in the kidneys. The bowels can be kept open by the intelligent use of salines. Sweating can usually be induced by the use of hot water, and measures calculated to keep the skin in a state of high activity should be employed even before there is an appearance of œdema. In children the wet pack is probably more convenient than the bath. The child should be wrapped in a heavy blanket wrung out of hot water, covered with a dry blanket and rubber-sheet, and kept in the pack for at least an hour; this may be done twice daily. In adults the hot bath

is preferable. The water should be gradually brought to a temperature of 95° to 100°, and the patient kept in it for at least fifteen to twenty minutes; he is then rapidly wiped dry, wrapped in a warm sheet or blanket, and put to bed. The use of a cool compress on the head and of an occasional sip of cool water will prove safe and grateful to the patient. He should remain, thus wrapped, for about three hours. The greatest care must be exercised not to let the patient get chilled.

The great usefulness of these hydropathic measures is generally recognized. In some cases, however, they are utterly in vain; nothing will bring about free sweating. In others, baths are not well borne; they must never be allowed when the patient suffers from dyspnœa or cardiac weakness; here the wet pack in bed must be taken as a substitute. If the skin remains dry in spite of all these attempts to bring on sweating, pilocarpine (gr. $\frac{1}{8}$ to $\frac{1}{3}$ in an adult; gr. $\frac{1}{30}$ to $\frac{1}{12}$ in a child from two to ten years of age) may be used by the mouth or hypodermically; in either case great caution must be exercised, since this measure is not free from danger. If the dropsy becomes extreme, and all other agents fail, the skin may be punctured by lancet or aspirator, and escape of the fluid secured by means of a small silver canula or, in case of the aspirator needle, by drainage through a long narrow tube, with the vessel on the floor. Aspiration may have to be performed if pressure of fluid in the pleural cavity results in distressing dyspnœa. In case of ascites, paracentesis may be indicated. Acute suppression of urine demands active sweating and even saline diuretics. In desperate cases the application of hot flannels saturated with the tincture of digitalis or of poultices of the leaves of digitalis over the loins has been recommended in spite of the fact that this practice is not free from great danger of collapse. *Uræmic convulsions*, if severe, demand the use of chloroform, especially when they occur during pregnancy. In milder cases, when the convulsions are not frequent, tepid baths with cold showering are said to be helpful. Dry cupping of the loins, pilocarpine, the wet pack, purgatives and, in adults, free venesection are recommended. If *vomiting* is severe, it is often much relieved by the use of oxalate of cerium or bicarbonate of sodium in the milk. It may be necessary to restrict the diet. If the vomitus contains ammonia,

ten to fifteen drops of dilute hydrochloric acid should be given in water three or four times daily. If uncontrollable by other means, it may be necessary to have recourse to bits of cracked ice. Much attention should always be paid to the condition of the heart and arteries; if the latter are contracted, nitroglycerine, chloral hydrate or opium may be called for; if the heart's action is feeble, digitalis, strophanthus and caffeine, with alcoholic stimulants, are of value.

Therapeutics.—**ACONITE** is of service only in idiopathic cases following exposure, with much congestion, and possibly difficult, burning, painful urination. Chill and characteristic fever.—**APIS MELLIFICA.** Aching in the lumbar region, with soreness in the region of the kidneys and bruised sensation in the abdominal walls on deep pressure. Urine dark, scanty, almost suppressed, loaded with casts; extensive dropsy, with absence of thirst; restlessness; dryness of the skin. Under the exhibition of the **APIUM VIRUS**, especially in cases of post-scarlatinal nephritis, I have seen brilliant results, the urine rapidly increasing, with lessening of albumin, and, often, comparatively rapid disappearance of the dropsy. It has proved of great value when dyspnoea was marked, also when brain symptoms of pronounced character were present.—**ARSENICUM.** The urine is dark, turbid, bloody, albuminous, and often voided with much burning pain. Œdema and dropsy. There may be gastro-intestinal irritation, with characteristic vomiting and thirst. The characteristics of the remedy are so strongly impressed upon the patient that they are easily recognized.—**CANTHARIDES.** Severe inflammatory, lancinating pains in the region of the kidneys, extending into the lumbar region; they appear suddenly, are intense, and momentarily arrest breathing. The characteristic dysuria may be present. Urine scanty, bloody, albuminous, full of casts. Of service only in the early stage of nephritis.—**HELLEBORE.** Subacute nephritis, with complete suppression of urine, or scanty, very dark urine. Dropsy. Especially useful in children, after scarlet fever.—**HEPAR SULPHUR. CALC.** Soreness in the region of the kidneys, with constant urging to urinate; diarrhoea; albuminous urine; oily film on the surface of the urine. After abuse of mercury. In diphtheritic cases.—**MERCURIUS (CORROSIVUS).** Urine scanty, sometimes bloody, of strong smell, purulent, with whitish,

flocculent, shreddy sediment; burning and tenderness. Pain in the back, of a dull character; very moderate fever.—PHOSPHORUS. Urine scanty, dark-colored, with whitish sediment, containing fatty casts.—TEREBINTHINA. Dull, burning pain in the region of the kidneys, extending into the bladder, with strangury and bloody, albuminous urine. Nephritis following an acute disease.

CHRONIC BRIGHT'S DISEASE.

The processes described under this head continue for months and, sometimes, years. Two forms are distinguished: Chronic Parenchymatous Nephritis and Chronic Interstitial Nephritis.

CHRONIC PARENCHYMATOUS NEPHRITIS.

Synonyms.—Chronic Desquamative Nephritis. Chronic Tubular Nephritis. Chronic Diffuse Nephritis with exudation. Large White Kidney. Secondary Contracted Kidney. Second Stage of Bright's Disease.

Ætiology.—Until recently it was thought that this affection in the majority of cases followed acute Bright's disease, practically constituting a second stage of that disease; hence the name "Second Stage of Bright's Disease" (Frerichs). It is now known that this occurs only in exceptional cases, as occasionally in scarlet fever or in the acute nephritis of pregnancy, when the patient, instead of recovering, gradually drifts into chronic kidney disease. It is, however, not well to wholly overlook the possible connection of chronic nephritis with acute infectious fevers. As yet, no specific ætiological factor has been found; if of toxæmic or infectious origin, we are ignorant of it. The disease is seen much oftener in men than in women, usually before middle life, rarely in the young or old. Malaria, chronic anæmia, chronic suppurative processes in almost any of the structures of the body, syphilis, tuberculosis and cancer are connected with it. Persons who are in the habit of drinking large amounts of beer and alcohol appear to furnish many victims.

Morbid Anatomy.—Struempell and others emphasize the pathological entity of the various forms of Bright's disease and the fact that in the essentials these forms differ but little, save in their duration and in the progressive changes worked in the cases which persist for years as compared with those of comparatively brief duration.

The so-called "*Large White Kidney*" (Wilks) is the most common form. The kidney is enlarged or of normal size, more frequently the former; the capsule is thin and sometimes adheres in spots; the surface is smooth, white or of pale gray, mottled with white or yellowish specks; the stellate veins are injected. Upon section the cortex is found to be swollen, of yellowish-white color, more or less mottled as the result of fatty degeneration of the epithelium of the convoluted tubes. There is usually congestion of the pyramids; hence they appear reddened. The microscope shows more or less destruction of renal tissue, with moderate increase of interstitial connective tissue. The epithelium is granular and has undergone extensive fatty degeneration; the glomerular epithelium may be proliferated or desquamated. Tube-casts abound in the uriniferous tubules, and hyaline changes are marked in the epithelium and vessels. The glomeruli are enlarged, their capsules thickened, and epithelial changes extensive. Trifling hæmorrhagic effusions are common here. When the hæmorrhagic effusions are large, into and about the tubes, this fact constitutes *chronic hæmorrhagic nephritis*, in which case the anatomical changes peculiar to the large white kidney are present, the organ itself presenting a grayish-red appearance, and the mottly consisting of darkened, hæmorrhagic spots with lighter gray or yellow spots of anæmic fatty tissue.—*Small White* or *Pale Granular Kidney* denotes a step further in the process of destruction, and may therefore be considered secondary to the Large White Kidney, although the claim is made that this cannot always be shown to be true. The kidney here is of almost normal size, with thickened capsule and granulated surface. There is extensive formation of connective tissue which takes the place of the destroyed renal tissue, with more or less extensive cicatricial contractions. The density of the organ is increased; in color it usually is reddish-gray and mottled, the atrophied parts appearing reddish. On section, resist-

ance to the knife is found greatly increased; the cortex is reduced, with many foci consisting of accumulation of fatty epithelium in the convoluted tubules. The arteries are frequently much thickened. The striking changes in distant organs consist of hypertrophy of the left heart and thickening of the blood vessels. The term "secondary contracted kidney" has been applied to this form to distinguish it from the genuine contracted kidney described hereafter.

Symptoms.—When the chronic form is the sequel of acute nephritis, it will be impossible to draw the line between the two or to describe the initial symptoms of the former. But in nearly all cases the disease is insidious. There is more or less indisposition, loss of appetite and strength, general dulness, pallor and headache. These develop so gradually that slight attention is paid to them, and no uneasiness is felt until œdema appears. This, here, is quite liable to first show itself about the ankle and legs, more rarely in the face. In the ankles it is always worse at night and much better in the morning; puffiness of the face is most noticeable in the morning. In every case it is slowly progressive. The *urine* is always diminished in amount, two pints or less in the twenty-four hours, and may be exceedingly scanty. It is smoky, sometimes of a dark, blackish red, from the presence of blood; turbid; often of a dirty-yellow; acid in reaction, of high specific gravity (1.020 to 1.025); which, however, is lowered during the latter part of the disease. Upon standing a heavy sediment is deposited, consisting of tube casts, leucocytes, blood corpuscles, hyaline, epithelial, granular and fatty casts. These must be carefully examined and especial attention paid to the deposits which cover them, since they throw important light upon the inroads already made upon the renal tissues. The constant presence of large amounts of blood shows that we are dealing with a case of chronic hæmorrhagic nephritis, and an abundance of fat granules and fatty granular cells, or of a greasy, lustrous layer on the urine, indicates large, white kidney. There is always a deficiency of urea and a large amount of albumin, especially in the urine voided during the day, often amounting to one-half of the urine boiled, and representing a daily loss of albumin which may reach from four drachms to an ounce.—*Dropsy* is pronounced and obstinate. The severer the case, the greater

the dropsy, save in the atrophic form, where the urine may be increased with a corresponding diminution in the dropsical effusion. It is general, with a tendency to effusion into the serous sacs. Osler points out that in large, white kidney the complexion is often peculiarly pasty, the pallor marked, and the eyelids pronouncedly œdematous.—*Uræmia* is common, and, as in acute nephritis, largely responsible for the obstinate headaches and vomiting which trouble the patient. Uræmic convulsions may occur, although less often than in interstitial nephritis. Albuminuric retinitis is present in some cases, with retinal hæmorrhage or the appearance of white spots or streaks, especially near the optic nerve.—*Vomiting* frequently is severe and obstinate; there may be constipation or diarrhœa, and ulcerative and dysenteric processes, sometimes fatal, may take place in the colon and ileum.—*Headache*, of anæmic or uræmic origin, often is distressing.—The *circulatory system* shows characteristic changes in the increased tension of the radial pulse, increasing stiffness of the vessels, and the cardiac hypertrophy, with or without dilatation, which invariably develops, save in cases where there is such utter physical exhaustion that not sufficient nutritive material can be spared to bring about the hypertrophy. In the presence of extensive dropsy many of the physical signs of cardiac hypertrophy may not be available; but the character of the radial pulse, the displacement and increased force of the apex beat, and the accentuated aortic second sound will lead to a recognition of the hypertrophy. Complications of a serious character are: œdema glottidis, bronchitis, pneumonia, pulmonary œdema, hydrothorax, more rarely endocarditis and pericarditis.

Prognosis.—The course of chronic nephritis is protracted and uniform, running from a few weeks to two or three years, during which time, in tedious cases, exacerbations and remissions may be quite frequent. The most protracted cases are those of small, white kidney. Recovery may take place, especially when the disease, as sometimes happens, is limited to a small portion of the kidney; but generally the prognosis is exceedingly serious, and a case which has run for more than a year may be considered almost hopeless. Death occurs from extensive effusion with œdema of the lungs or larynx, from secondary inflammation of the serous cavities or of the lungs, or from uræmia.

Diagnosis.—No difficulty can be experienced in recognizing chronic Bright's disease. Differentiation between the various forms rests chiefly upon examination of the urine. In *chronic hæmorrhagic nephritis* the urine is rich in red blood corpuscles and casts; the duration of the disease is from six to eighteen months. In the *large white* kidney traces of blood are slight or absent. There are fatty granular cells or drops of fat in the urine, which is markedly albuminous. Œdema is strongly marked. Death from uræmia is frequent; duration six to eighteen months.—*Small white* kidney (secondary contracted) runs a longer course, sometimes three years. After the case has run for a long time the urine becomes more abundant and the œdema is much improved. Death usually occurs from cardiac insufficiency, with increased dropsy or uræmia.

Treatment.—The treatment is that of acute nephritis. The patient must be kept warm, and should lie quietly in bed. If able to be about, heavy woolen undergarments must be worn. Since many of the symptoms are relieved by residence in a warm equable climate, at least the winter months should be spent in the South; but even here particular care must be exercised to protect the patient against exposure and strong, chilly currents of air, especially near the sea-coast. The diet must be plain, non-nitrogenous, and will consist chiefly of milk, preferably skim-milk, butter-milk, and koumyss, with oat-meal and other farinaceous substances well cooked. Pure water should be drunk freely. The patient should take at least three quarts of liquid in the twenty-four hours. The dropsy demands the treatment described in the preceding chapter. The systematic use of vapor baths, taken according to the strength of the patient, is very important, and must be rigorously maintained, even as often as twice each day, if uræmic symptoms threaten; the use of pilocarpine, elaterium, and other agents likely to relieve the strain upon the kidneys, is also indicated. Surgical treatment of dropsy should be delayed as long as possible. The condition of the heart will sooner or later demand the exhibition of digitalis, strophanthus and caffeine. The strontium salts, it is thought, exert a favorable action upon the nutrition of the kidneys, and on that account the employment of the lactate of strontium, thirty to fifty grains per day, in divided doses, has been highly recommended. Iron (ferric chloride, 1

to 3 grs.) is still a favorite prescription with many.—ARSENICUM, MERCURIUS (SOLUBILIS or CORROSIVUS) and PHOSPHORUS are the most promising constitutional remedies.

CHRONIC INTERSTITIAL NEPHRITIS.

Synonyms.—Contracted Kidney. Granular Kidney. Granular Atrophy of the Kidney. Sclerosis of the Kidney. Renal Sclerosis. Gouty Kidney. Third Stage of Bright's Disease(?).

The essential feature of contracted kidney is a continuous and progressive atrophy of the renal tissue, with corresponding increase of interstitial connective tissue. It occurs occasionally as a sequence of chronic parenchymatous nephritis, but oftener as an independent primary disease, frequently associated with arterio-sclerosis.

Ætiology.—The frequency of chronic interstitial nephritis in the latter part of life, from forty to sixty years of age, renders it probable that in many cases it may be considered a part of the general breaking up of the system which characterizes advanced years, a proposition rendered the more probable from its close relationship to arterio-sclerosis. Predisposition to contracted kidney is strongly marked in many cases, and here again family tendency to both renal sclerosis and sclerosis of the vessels go hand in hand. Whatever irritates the kidneys necessarily increases this tendency; hence generous living, fondness of and indulgence in a diet largely composed of meat, with insufficient exercise, much worry and close application to business, account for the frequency of the disease among the better classes. Among the specific causes the poison of syphilis, alcohol, malaria and lead (type-setters and painters) are to be mentioned. Gouty, rheumatic and lithæmic conditions are predisposing causes.

Morbid Anatomy.—The kidneys are greatly reduced in size, even to one-half or one-third of normal; they are dense and firm to the touch. The capsule is thick and adherent, so that it cannot be stripped off without removing parts of the underlying tissues. The surface is irregular, nodular, granular, the raised portions appearing of darker color than the depressed parts; small cysts are sometimes seen on the surface. The color usually is dark red or reddish. The cortex is thin and pale; the

pyramids are short, wasted, rather pale, with occasional striated uric acid formations in the gouty contracted kidney. The small arteries are conspicuous and thickened. The organ is resistant to the knife and embodied in a thick layer of fat. Microscopically there is atrophy and degeneration of the secreting structures with corresponding increase of interstitial connective tissue, more advanced than in chronic parenchymatous nephritis. The fibrous elements are especially abundant in the cortex. Small-celled infiltration between the tubes and around the glomeruli is seen in the early stage; later it becomes fibrillated. The glomeruli show capsular thickening and increase in the cells of the tufts; more advanced changes are atrophy and hyaline degeneration. The presence of constantly increasing connective tissue leads to atrophy of the tubules with eventual disappearance of the epithelium. Granular, fatty, and hyaline changes in the epithelium and dilated tubules, containing epithelial débris and tube-casts, constitute the projecting granules. The dilatation of the tubules may be sufficient to form small cysts. Pigmentation from hæmorrhage is rare. The arteries show atheromatous and sclerotic changes.

Arterio-sclerosis and cardiac hypertrophy are constant; the enlargement of the heart may involve the left ventricle or may be general, and in exceptional cases may be enormous.

“The combination of chronic fibrous nephritis and the deposition of urates is spoken of as a gouty kidney, and is often found among persons leading a life of luxury; while the fibrous kidney associated with lime salts has been regarded as evidence of a poor man’s gout” (Wood and Fitz).

Symptoms.—In many cases, perhaps in a majority of them, the existence of sclerotic kidney is not suspected until failing eye-sight brings the patient under the care of a specialist and examination of the eye demonstrates the presence of eye-symptoms which unmistakably point to serious renal lesion, or when a careful examination is made for the purpose of securing life insurance. It is not infrequent to have death occur from uræmic poisoning or from cerebral hæmorrhage, a *post-mortem* examination disclosing evidence of advanced renal affection in persons who had appeared in, at least, average good health. In others, suspicion is aroused by the continuous development of a long train of symptoms consisting chiefly of great exhaus-

tion, sleeplessness, headache, poor appetite, indigestion, difficulty of breathing on exertion and, possibly, failure of eyesight; if, with these, the patient is obliged to urinate frequently at night it is reasonable to presume that disease of the kidney is developing.

The *urinary* symptoms are of extreme importance. At first the amount of urine is less than normal, somewhat albuminous, and the solid constituents are diminished. Later, compensation is established, the blood pressure raised, and the amount of urine voided is greatly increased. It is at this period that the case is likely to come under the observation of the medical man. The urine now is copious, from two to four pints being passed in the twenty-four hours, the patient's rest being broken by the necessity of repeatedly emptying the bladder during the night. The urine is acid, clear, of light-yellow color, of a specific gravity varying from 1.005 to 1.010 or 1.012, and usually with scanty sediment, deficient in solid constituents, but often containing a full percentage of urea. The sediment may contain a few hyaline or granular casts, rarely leucocytes, renal epithelium, red blood corpuscles or fat. In exceptional cases a habitual tendency to bleeding is noticed, especially after taking violent exercise, and the urine then has a pale smoky appearance. In the late stage of renal sclerosis the urine may again be diminished and richer in albumin; this is especially the case when there are complications with bronchitis or dyspepsia. The *pulse* soon assumes a hard, tense character, due to stiffness of the artery. This symptom is of great practical importance. Osler calls attention to the fact that the thickness of the vessel may be ascertained by eradicating the pulse wave in the radial and feeling the vessel wall beyond it. If normal, the arterial coats under these circumstances cannot be distinguished from the surrounding tissues; if thickened, the vessel can be rolled beneath the fingers. *Cardiac hypertrophy* becomes a physiological necessity in order to overcome the resistance in the arteries, and is absent only in persons so weak or cachectic that a compensatory effort cannot be successfully made. The hypertrophy may involve the left heart only, or it may be general and very great. The physical signs peculiar to this condition are present; but examination of the heart is often rendered difficult and unsatisfactory by existing pulmo-

nary emphysema, especially in old persons. In due time, dilatation of the heart takes place, followed by the long and distressing train of symptoms peculiar to that state, including œdema and general dropsy. The severe headaches from which patients in this condition often suffer are in part due to the condition of the heart; they are largely anæmic in character, usually one-sided, shooting into the back of the neck, and are associated with vertigo, troubled sleep and despondency.—*Respiration* is almost always a trifle labored, and assumes later on the type of a fixed dyspnœa, especially at night, often resembling asthma; it is partly of uræmic, partly of cardiac, origin. Cheyne-Stokes breathing may be noticed, not only toward the end, but when the patient is still able to be about. There is great liability to attacks of bronchitis, particularly during cold weather; lobular pneumonia is an occasional complication, and pleural effusions and pulmonary œdema may occur, often proving rapidly fatal. Exceptionally, œdema of the glottis is seen.—*Vomiting* may be violent and uncontrollable from the start, and may be due to uræmic poisoning. In other cases severe and even fatal diarrhœa is present. In still others the digestive system is less disturbed, but there is always more or less foul coating of the tongue, heavy and urinous breath, loss of appetite and insufficiency of digestive power.—*Uræmia*. Danger of uræmic poisoning increases with increasing scantiness of urine, but pronounced symptoms of it may suddenly appear when an almost normal amount of urine is voided; again, the patient's condition may be threatening, and yet recovery take place; the condition, however, is always serious. Various expressions of uræmia have been described. One of the most interesting is the failure of vision and eventual blindness which occur with especial frequency in this form of renal disease. Sometimes, as already stated, failure of vision affords the first clue to the real condition of the patient's health. Flame-shaped or multiple hæmorrhages, diffuse retinitis and papillitis are the commoner affections of the eye seen in this connection. Ringing in the ears, with dizziness and deafness, are not infrequent.—*The nervous system*. In addition to the disturbances of the nervous system which are due to uræmia, the most serious is cerebral apoplexy, the result of increased pressure in vessels whose walls are weakened by sclerosis. It is by no means un-

common. It may take place into the meninges or cerebrum, and may pass off with a resultant hemiplegia or prove fatal. Neuralgia in different parts of the body is frequent. *Hæmorrhage* occurs into the skin, stomach, intestines, lungs, or from the nose; in rare cases it seems as though a hæmorrhagic diathesis were developing. The bleeding depends upon arteriosclerosis. Cases of fatal epistaxis are reported by many writers. The *skin* usually is pale and dry. Sweating is uncommon, and when it takes place a deposit of urea may be left on the skin, especially on the face. Eczema is frequent. In many cases much suffering is caused by intolerable itching of the skin; others suffer much from cramping of the muscles. As stated, œdema and dropsy are comparatively rare, though puffing of the ankles is not unusual; if extensive, the condition is due to existing heart failure or, in cases of ascites, to cirrhosis of the liver. Of complications, pneumonia is the more common.

Duration and Termination.—In view of the difficulty of fixing the onset of renal sclerosis, the probable duration of any given case can rarely be accurately determined. The affection, however, is not incompatible with a fair degree of useful activity and many years of life, cases having been under observation for ten and fifteen years. In the absence of exceptionally severe features, as uræmic poisoning, the issue of the case depends almost entirely upon the ability of the heart to carry on its work—i. e. upon its “staying” qualities—and much can be done to maintain this indefinitely. As soon as heart failure sets in, an early fatal termination becomes inevitable. Frequent periods of improvement also tend to spin out life, while, on the other hand, the hope of continued fair health may be cut short by an unexpected exacerbation of symptoms or by some fatal complication. A cure, at the present state of medical science, cannot be expected.

Diagnosis.—The diagnosis is exceedingly difficult in the early stage of the disease if the first examination is made immediately after a sudden attack of uræmia or cerebral apoplexy, and late in the disease if the patient is first seen after dilatation and failure of the heart has taken place. In the latter case differentiation from some form of cerebral disease is surrounded with great uncertainty, and in case of heart-dilatation the symptoms of the primary disease are likely to be wholly ob-

scured by those of the cardiac affection. It is a consolation to know that for practical purposes the diagnosis under such conditions is of slight moment. In the average case the diagnosis rests upon the results of urinary analysis, the quality of the pulse, the existence of thickening of the walls of the vessels, signs of cardiac hypertrophy (left ventricular or general) and the presence of such disturbances in the retina as have been described. The examinations of the urine must be made often and with great care, especially so when no albumin has been detected, and should cover the evacuations made both morning and evening.

Treatment.—The inability to cure a contracted kidney renders of double value all measures calculated to increase the opportunity for continued life and usefulness by carefully watching over the heart, arteries and kidneys. In persons of middle life nothing is as likely to reduce to a minimum the danger of renal sclerosis as the habitual use of the Turkish bath, under proper precautions. The disease once established, every effort must be made to place the patient under the most favorable surroundings. If at all possible, a *permanent* residence must be found in a warm, even climate, such as Southern California offers; there he can live in the open air, away from many of the temptations, worries and inclemencies of the Eastern and Northern states, and thus exhaust to the full the advantages arising from a normal, natural life. The bowels are to be kept open and the skin kept in a healthy condition by regular bathing. The kidneys must be freely and constantly flushed by copious draughts of pure water. The diet must be light and nourishing, eating meat not oftener than once a day at the very most; alcoholic drinks are to be interdicted, and tea and coffee taken in great moderation, if at all.

The necessity of special medication does not arise until special conditions or symptoms demand attention. Thus, if the pulse tension is evidently too high, with headache, dizziness and oppressed breathing, the administration of nitro-glycerine, one minim of a one per cent. solution (2x) three times a day, gradually increased, and maintained for some weeks, will usually afford relief. The remedy should be discontinued after some weeks, to be renewed when necessary. Cardiac dilatation and heart failure demand the treatment given under their appro-

priate heading. If anæmic, ARSENIC, CHINA, IRON (preferably the perchloride of iron), PHOSPHORUS, and others, are to be consulted. In case of uræmic poisoning the bowels are to be opened by a brisk saline purge, and sweating induced by the use of hot baths or of subcutaneous injections of pilocarpine, as in acute diffuse nephritis. The homœopathically indicated remedies are those given under the same heading, to which may be added as possibly useful the following: AURUM, when there is a mercurial or syphilitic taint. Vertigo. Characteristic nervous symptoms; tendency to hypochondriasis.—BENZOIC ACID, in cases of gouty diathesis, with vesical catarrh and very offensive odor of the urine.—NITRIC ACID in syphilitic subjects; after abuse of mercury; in necrotic conditions of bony tissue. Skin dry and hot. Œdema of the lower leg. Urine muddy, scanty, of foul odor.

AMYLOID DISEASE.

Amyloid, waxy, or lardaceous degeneration of the kidneys may be looked upon as part of a special degenerative process involving other organs of the body, especially the spleen, liver and intestine. It may occur in connection with previously existing renal disease, more often in chronic diffuse nephritis and sclerosis of the kidney, or without it. The conditions which favor amyloid degeneration are great general weakness and profound cachexia, usually associated with ulceration and cavity-formation. Here belong: chronic tuberculous processes, especially of the lungs, also of the intestine, with ulceration; chronic suppuration anywhere, but particularly of bony tissue and joints; syphilis, with ulcerations and tertiary disease of bones and mucous membranes; also the chronic suppuration in old, chronic ulcers; saccular bronchiectasis; fistulæ; ulcerating new-growths; all diseases characterized by extensive and long-continued formation of pus.

Morbid Anatomy.—Amyloid degeneration of any organ begins in the wall of the small vessels and may, and usually does, later affect the interparenchymatous connective tissue, but rarely involves the parenchymatous cells proper, as the liver cells or renal epithelium. The walls of the affected vessels become much thickened, assume a homogeneous, lustrous appearance, and yield a reddish-brown or mahogany color when

treated with compound solution of iodine. If the amyloid degeneration is extensive, the affected organ becomes lardaceous, bacon-like, in appearance. In the amyloid kidney associated with some other form of renal disease the picture is necessarily complex, and for the sake of brevity the anatomical changes peculiar to chronic diffuse nephritis and contracted kidney need not be here repeated. In slight cases of amyloid kidney the organ may appear normal to the naked eye and the microscope show only insignificant amyloid changes in the walls of the vessels in the cortex and medullary substance. In the typical large white amyloid kidney there is enlargement of the organ; the surface is smooth, of grayish-white color, sometimes mottled. On section the cortex appears yellowish-white and abnormally large; the glomeruli are large, appearing as dull, lustrous, translucent points. The pyramids are deep-red. Traces of hæmorrhages are rare. The microscope in pure amyloid kidney demonstrates amyloid degeneration in the glomeruli, the capillaries of the cortex, vasa recta, and sometimes the membranous portion of the tubules, with a normal condition of other renal tissue. More often, however, there is diffuse nephritis, or other renal lesion, with characteristic anatomical changes.

Symptoms.—As seen in the sick-room, it is often difficult to distinguish the symptoms of simple amyloid degeneration of the kidneys from those caused by primary renal lesions. If trifling in extent, no characteristic symptoms whatever may be produced. If well advanced, the urine is abundant, acid, pale-yellow, clear, and rich in albumin, often containing two per cent. of the latter. According to Senator, globulin may be present in addition to the ordinary albumin. The specific gravity is rather low; it varies greatly in different cases and at different times in the same individual. There usually is little sediment; it contains some hyaline casts and leucocytes, possibly a few red blood corpuscles and fatty, waxy, finely granular casts; but the latter are more characteristic of coexisting renal inflammation than of the purely amyloid state. Dropsy is a frequent, but not a constant, symptom, and is undoubtedly most pronounced in profoundly anæmic or cachectic subjects. Diarrhœa is common, and may be quite severe; it may arise from tuberculous ulceration or amyloid of the intestine. In ad-

dition, there may be hypertrophy of the heart and uræmia, but these belong to coexisting disease of the kidney and are in no wise connected with amyloid disease pure and simple. Albuminuric retinitis can hardly be associated with amyloid disease proper and compensatory cardiac hypertrophy is practically impossible in the utterly low and cachectic condition with which amyloid degeneration is so intimately connected. Symptoms of amyloid degeneration in other organs are likely to exist and impress themselves upon the case; splenic, hepatic and intestinal disease are especially important, and are usually recognized without difficulty.

Diagnosis.—The diagnosis rests upon the existence of sufficient cause for amyloid degeneration in other organs of the body; evidence of amyloid degeneration in other parts of the body; abundant and clear urine, poor in morphological elements, rich in albumin. The diagnosis is rendered obscure by the presence of profound inflammatory changes in the kidneys.

The prognosis is that of the primary disease. Since amyloid degeneration is in itself an expression of a profoundly cachectic state, its existence in any given case must be considered an exceedingly unfavorable sign.

The treatment is that of Bright's disease.

PYELITIS.

Pyelitis, pyelonephritis, pyonephrosis, is an inflammation of the renal pelvis. Very rarely it occurs as a primary disease, the result of exposure, and when so, oftener in children than in adults. Usually it is secondary, from extension of inflammation in other organs (acute or chronic inflammatory disease of the kidneys, cystitis or ureteritis) or in the course of acute infectious diseases (typhoid fever, small-pox, etc.), in which case the attempt at elimination of the offending infectious material has resulted in setting up a local inflammation in the renal pelvis. The presence of foreign bodies, especially of calculi, is a frequent cause. Irritation from tubercular or cancerous disease, of hydatids, the presence of ova of parasites (*hæmatodes*, *strongylus*), irritation from highly saccharine urine, and the passing effects of such irritating drugs as cantharides, turpentine, cubeb, etc., are also important ætiological factors. Cases

may result from bacterial infection, as after operations upon the bladder or urethra when rules of surgical cleanliness have been violated, or under similar conditions in child-bed. The presence of decomposing urine, possibly from pressure of a tumor upon the ureter, may also give rise to pyelitis. The affection is more common in men than in women, and usually occurs in adult life.

Morbid Anatomy.—In light or early cases the mucous membrane is reddened, swollen and turbid, often ecchymotic and covered with a sticky secretion which holds pus-corpuscles and epithelium. If secondary to cystitis, both kidneys are usually involved, and there develops suppurative, ulcerative, and even diphtheritic inflammation. Lines of suppuration with injected borders extend along the pyramids toward the cortex; these enlarge, become confluent, soften in the center, and form small abscesses in the cortex or beneath the capsule. If pyelitis results from the continuous irritation of a calculus, a slight primary catarrhal irritation of the mucous membrane soon gives way to roughening and thickening, and the membrane assumes a grayish color. The kidneys themselves are extensively involved (pyelo-nephritis), and the process terminates with gradually increasing dilatation of the calyces and resulting atrophy of the renal structure, the kidney eventually constituting a sac of pus and the renal tissue sometimes completely disappearing. In tubercular nephritis the same process occurs. In either case, with obstruction of the pelvic orifice, inspissation of pus may take place, the kidney constituting a number of small sacs which contain a grayish, putty-like substance, often abundant in lime salts. This inspissation of pus is particularly frequent in connection with tubercular nephritis, and then constitutes the so-called "scrofulous" kidney.

Symptoms.—Since pyelitis is nearly always found in connection with another and broader lesion, its symptoms usually are subordinate to those of the primary disease and lack in individuality. In mild cases there is some pain in the back, with tenderness to pressure in the affected region. The urine is acid, turbid, often slightly albuminous, and may contain a few mucus and pus cells, possibly some blood corpuscles. *Pyuria* is present in variable degree; it may be intermittent, occasional blocking of the ureter on the affected side stopping the

flow of pus for the time being, the urine, discharged from the healthy side, appearing normal; yielding of the obstruction allows the escape of the pent-up pus. The pus itself is not in any sense characteristic. Tubular casts and fragments of renal tissue may be discharged with the pus. The urine continues acid, unless there is cystitis, in which case it is ammoniacal. *Fever*, with rigors and sweating, is present in most cases; its appearance indicates the onset of pyelonephritis. It usually is irregularly remitting, but sometimes resembles malaria in the regularity of its recurrence. In some cases it assumes a hectic type. It often is accompanied with profound nervous disturbances and culminates in coma; when the nervous symptoms appear to result from the absorption of decomposing matter in the urine, they are grouped under the term "ammoniaemia." Occasionally a case closely resembles typhoid fever, particularly when of tubercular origin. The general symptoms are those of a wasting disease; the patient loses appetite, flesh and strength, and becomes profoundly anæmic; if secondary abscesses form, a pyæmic state prevails.

Diagnosis.—The diagnosis rests upon the history of the case, the presence of pus in the urine, and the absence of pronounced vesical tenesmus. It is no longer thought that the appearance or arrangement of epithelial cells from the renal pelvis differs from those of the bladder. *Perinephric abscess* may be differentiated by the presence of an œdematous swelling in the lumbar region, the absence of a clearly defined tumor which is present in many cases of advanced pyonephrosis, the history of the case, and the freedom, in some cases, of the urine from pus.

Prognosis.—The prognosis is favorable in the pyelitis of infectious fevers or of toxic irritants; less favorable in cases of tubercular origin; grave in pyelonephritis, in cases preceded by disease of the urinary tract, or when surgical treatment is demanded. Recovery, however, may take place in very unpromising cases.

Treatment.—Rest, nourishing diet, and a liberal allowance of fluids, especially alkaline mineral waters, are important. The general health should be carefully looked after, and such remedies as ARSENICUM, LYCOPODIUM, TEREBINTHINA, SAW PALMETTO, SILICA and HEPAR SULPH. CALC. exhibited as indicated. The insufficiency of internal treatment must, however,

be admitted. If due to a calculus, measures hereafter described will have to be considered. If depending upon cystitis, vesical irrigation and drainage will become necessary and appropriate medication is of great service. Empirically, the internal administration of boric acid, ten grains three to six times daily, has been thought useful. If all these prove ineffective, and particularly when there is increasing enlargement in the region of the kidney with aggravation of the constitutional symptoms, the case must be promptly transferred to the surgical specialist.

HYDRONEPHROSIS.

A dilatation of the pelves and calyces of the kidneys, caused by the accumulation of non-purulent fluids (urine) from obstruction. The obstruction may occur at any part of the urinary tract, giving rise to a stasis of the urine back of the obstruction, followed by constantly increasing dilatation above. If the obstruction be in the ureter, the ureter above and the kidney to which it is related are involved; the obstruction being located in the urethra, both kidneys suffer, and the resultant hydronephrosis is bilateral.

Ætiology.—The conditions leading to nephrosis may be classified into contractive, compressive and constrictive. The former embrace chiefly inflammatory conditions of one or both ureters, with obliteration of their lumen. Among the “compressive” may be mentioned contraction or twisting of the ureters, oblique insertion of the ureter, pressure from without by inflammatory processes or from tumors, chiefly ovarian and uterine, or from cicatricial tissue. “Obstructive” causes are the result of inflammatory action (adhesion, cicatrization) at any point within the urinary tract, the lodgment of calculi, new growths (tubercular, cancerous) and such affections as cancer of the bladder or prostatic hypertrophy with cystitis. Hydro-nephrosis may be congenital, due to contraction, twisting or too high or faulty insertion of the ureter, or to some other congenital malformation.

The accumulation of the fluid in the pelvis and infundibula may give rise to inflammation; more often the steadily increasing dilatation, by pressure, results in gradual wasting of the organ, increasing yielding of the enfeebled parts, and event-

ually the formation of a cyst containing a large amount of thin, yellowish fluid, rich in urinary salts, urea, uric acid, sometimes albumin, and occasionally pus. If the obstruction is rapid and complete, the secretion of urine ceases early, even though not entirely; hence the dilatation in such cases is not nearly so large as in slowly developing incomplete or periodic obstruction (as from calculus); in the latter the dilatation may be enormous, and has been mistaken for a large abdominal tumor or ascites.

In case of unilateral hydronephrosis compensatory work may be done by the healthy kidney; hypertrophy of the left heart often follows.

Symptoms.—The symptoms of any given case depend chiefly upon the nature of the primary disease. In many cases, especially when hydronephrosis depends upon compression by a tumor, no symptoms are experienced. The most important symptoms are the tumor itself and such organic lesions in the kidney as may result from the pressure and dilatation. The tumor appears in the region of the affected kidney, gradually extending toward the hypochondrium and median line. It is usually resistant and moves with the respiratory effort, particularly when of moderate size. It presents a smooth surface and considerable fluctuation. It may be unilateral or bilateral, as one or both kidneys are affected. It often attains large proportions, and even when unilateral may occupy a very large portion of the abdomen. Anteriorly it may be crossed by the colon, which, when empty, may be felt, like a movable cord, and is easily distinguished, by palpation or inspection, when distended; if the tumor is large, the colon is usually displaced laterally. The growth of the tumor is particularly rapid in the intermittent form of unilateral nephrosis; here it often is associated with movable kidney, and readily attracts attention from the suddenness of its disappearance, with copious discharge of urine, when the obstruction yields, and by the rapidity with which it refills, a process which occasionally goes on for years. The character of the tumor is easiest recognized when of comparatively moderate size; when very large, it is more readily mistaken for ovarian, or some other abdominal, tumor. Its growth usually is accompanied with slight gastric uneasiness, eructations, vomiting, diarrhoea or constipation;

there is often moderate fever. Mechanically it causes dyspnoea by interfering with the movements of the diaphragm, and constipation. All these symptoms disappear promptly when the accumulated fluid is emptied. Upon aspiration, in comparatively recent cases, the withdrawn fluid contains the normal constituents of urine; if of long standing, the contents are sero-mucous. If only the healthy kidney secretes, the urine is normal; if there is pyelitis and cystitis, pus and blood are present; if lesion of the kidney exists, as sclerosis, characteristic casts, etc., are present.

The diagnosis depends chiefly upon the appearance of the tumor, an examination of its contents, and the history of the case. Thus, in young children it may readily be mistaken for sarcomatous kidney or sarcoma of the retroperitoneal glands. An *ovarian tumor* closely resembles a large hydronephrosis, but the former usually is more freely movable, does not so completely fill the deep lumbar region, and its real nature may generally be ascertained by a careful examination per vaginam; on the other hand, hydronephrosis may be suspected if the colon bears to the tumor the relation above described. Aspiration will settle the question; in hydronephrosis the fluid is clear, unless rendered turbid by the presence of cell-elements; it is rarely colloid; it is furthermore of low specific gravity, slightly albuminous, and contains traces of urea and uric acid.

Prognosis.—If unilateral or intermittent, the prognosis is not serious, and in the latter form permanent recovery may take place; bilateral nephrosis usually terminates in destruction of renal tissue proper, and is therefore a very grave condition. Cysts may rupture, usually through the peritonæum, rarely through the diaphragm into the lungs; occasionally rupture takes place through the ureter, sometimes with no reaccumulation. There is danger of uræmia in bilateral nephrosis and in the unilateral form when the ureter on the healthy side becomes blocked, as from calculus.

Treatment.—Very little can be done by the physician except to relieve pain, keep the patient as comfortable as possible, and meet symptomatic indications as they arise. In the intermittent form, with no threatening symptoms, treatment is naturally expectant. In acquired nephrosis massage has been used, occasionally followed by discharge of the fluid and disap-

pearance of the tumor; but there is great danger of causing rupture of the sac, suggesting the necessity of extreme care in the procedure. In the great majority of cases the treatment is surgical, consisting of puncture, incision, extirpation of the kidney, and establishment of a fistula. In a number of cases hydronephrosis has occurred in boys suffering from phimosis, an operation for the latter resulting in a complete cure.

NEPHROLITHIASIS (Renal Calculus).

Precipitation of the solid constituents of the urine, forming concretions of varying size and chemical composition, occur in the kidneys and renal pelvis. It is evident that they are likely to form slowly around a nucleus, such as is offered by a small blood clot, or a shred of epithelium, casts, or the ova of some parasite, but of the specific conditions under which such deposition is brought about very little is known. The old teaching that an excessive meat diet, or the use of drinking water containing lime, or of new sour wine, are largely responsible for the formation of these concretions is no longer entertained.

Observation shows that renal calculi occur with greater frequency among the young and the aged than in those of middle life, oftener in men than in women, and chiefly among those who follow a sedentary occupation.

The so-called infarcts, seen in the substance of the kidney, consist of deposits in the pyramids or at their apices of either uric acid (in the new-born or very young infants), urate of soda (in gouty persons) or of lime (oftener in the aged), and are of comparatively slight importance. The concretions found in the pelvis and calyces of the kidney vary in size from a gritty, sandy deposit to calculi as large as a pea or a bean or the even more extensive formations which occupy a large part of the pelvis and constitute a perfect mould of the parts (coral calculi). They may be single or multiple; of the small "gravel" immense numbers have been found. Many calculi may exist without producing extensive dilatation of the pelvis or otherwise causing serious harm; a person may periodically and for many years pass stones and suffer no mischief save the severe pain which accompanies their escape; and the most extensive coral formation may exist in the pelvis and calyces without

more than moderate induration. In other cases suppurative pyelitis and pyonephrosis may be sequels.

The *uric acid* formations are by far the most common and important; they may assume any of the shapes described. They are hard, of smooth uneven surface, of reddish, brown-red, blackish color. If large, they are laminated and very dense. *Oxalate of lime* formations are mulberry-shaped, of rough surface, studded with little spines or spikes; they are dark-brown and extremely hard. When broken, they often present a radiated, but never a laminated, arrangement. It is common to find calculi consisting of alternate layers of uric acid and oxalate of lime, or of a nucleus of uric acid covered with layers of calcic oxalate. *Phosphatic* calculi are composed of phosphate of lime and ammonio-magnesium phosphate, occasionally with some carbonate of lime. They are of grayish-white color, soft, friable. They are not so frequent in the kidney, the large specimens being found in the bladder. Unlike the other varieties, they occur in alkaline urine. Rare forms are those composed of *cystine*, which are of light-yellow color, lustrous, and in appearance resemble wax; of *xanthine* (hard, brown, very rare), *carbonate of lime*, *indigo* (dark-blue), and *urostealth*.

Symptoms.—Small calculi may pass out of the kidney, through the ureter into the bladder, and be expelled through the urethra without any pain or disturbance. This may be repeated many times in the same person.

Renal colic occurs when a stone of larger size enters the ureter and makes its way into the bladder. The attack in some cases is preceded by uneasiness and pain in the affected region, often extending into the flank, and accompanied with a sense of intense, deep-seated soreness. More commonly the onset is sudden, possibly after heavy lifting; but it may occur at night, rousing the patient from profound sleep. The pain is indescribable in its agonizing intensity. It usually involves the renal region and the flank of the affected side, extending downward into the groin, and often radiating into the abdomen and even into the chest. In many cases the testicle is retracted, painful and swollen, but so far as my observation on others and personal experience goes, the keenest suffering is in the flank. With the continuous pain is associated an intense, deep sore-

ness, with frequent paroxysms of acute aggravation; the suffering is so great that nausea and vomiting, sometimes hiccough, cold sweat on the forehead, and deathly faintness are very likely to occur even in strong and brave men, the pulse in the meantime becoming rapid and feeble. In children convulsions are common. Sometimes the temperature rises to 103° or 104° . While thus tortured beyond description, the patient is tormented by frequent and, usually, ineffectual and very painful urgings to urinate; the urine is passed with much effort, in small amounts, and often contains blood. At times, especially when the pain diffuses itself over the abdomen, there is tormenting and fruitless urging to go to stool. The attack may last for a few hours or may be continuous for the greater portion of the day; again, periods of severe pain may alternate with periods of comparative rest, and the paroxysms may be repeated after an interval of days, weeks, months or years. It is not unusual to have the patient feel the calculus work its way down the ureter, and know the moment it enters the bladder, this event being followed by immediate cessation of the acute pain. The paroxysm having ceased, a deep heavy aching remains in the side, with much "bruised" soreness and profound exhaustion, which may continue for several days. The urine after the attack may be copious, bloody and is voided with increasing ease, but it requires several days before the patient recovers his strength or is able to overcome the dread of a sudden recurrence of the colic.

If the stone remains in the kidney, its presence gives rise to more or less constant dull aching and soreness in the region of the affected organ, and sometimes to severe paroxysms of pain in the affected side; not infrequently the pain is referred to the sound side. The urine may be smoky from slight hæmaturia, which is often present and is increased from any exertion. Attacks of pyelitis, with pronounced chill, fever (104°), copious sweating and severe pain in the back may recur at intervals of many months. Purulent pyelitis, with or without pyonephrosis, may develop, or there may be for an indefinite period, sometimes for years, discharge of pus with the urine (pyuria). These are accompanied with emaciation, loss of strength or irregular fever. In other cases there is little, if any, trouble in the renal pelvis, but a chronic diffuse nephritis slowly develops in

the kidney itself, with slightly albuminous urine of low specific gravity and such changes and risks as belong to this condition. Should a calculus in its descent toward the bladder become impacted, the result is serious. If the ureter of only one kidney becomes obstructed, the accident will cause hydronephrosis or pyonephrosis; if there is but one kidney, or if the other kidney be already unfit, from disease, to carry on its work, or if the ureters of both kidneys become obstructed, total suppression of urine follows, with uræmia which is likely to prove fatal.

Diagnosis.—The diagnosis of stone rests upon attacks of renal colic, hæmaturia, and the discovery of concretions in the urine. In pyelitis or nephritis the presence of a stone in the kidney may be suspected, even if no attacks of renal colic have occurred, from the persistent character of the localized pain in the kidneys, aggravated by motion, and from the presence of blood in the urine. *Stone in the bladder* gives rise to uneasiness, pressure and pain about the neck of the bladder; the urine is alkaline.

Attacks of renal colic may resemble *intestinal colic*, but the latter, though possibly very severe, lacks the agonizing character of renal colic; there is wanting the frightful pain in the flank, the urinary symptoms, the retraction and tenderness of the testicle. *Intestinal colic* yields more readily to measures instituted for its relief. *Hepatic colic* is associated with dilatation of the gall-bladder and jaundice. The pain from *perforating appendicitis* is characterized by localized extreme tenderness which is not frequent in renal colic; on the other hand, there is no hæmaturia. *Nephralgia*, frequently associated with movable kidney, has no hæmaturia and no passage of stone.

While it is not possible to determine in advance the character of the calculus which is the cause of so much suffering, it is well to remember that the smooth surface of a uric acid calculus renders its presence less painful than that of the rough oxalate of lime concretion, which causes intense radiating pains, or of the phosphatic calculi which are said to give rise to even more intense suffering. It should also be borne in mind that the former occur in acid, while phosphatic calculi occur in alkaline, urine.

Prognosis.—An attack of renal colic is without danger to life,

save in rare complications, as impaction of a calculus in the ureter, and many attacks may be borne without permanent ill results. In case of anuria the condition is necessarily serious, but recoveries are on record after complete suppression of urine for many (even twenty) days. The danger arising from retention of a large stone in the kidney has been pointed out; the fact that a calculus thus retained for a long time has caused no inconvenience cannot be considered a proof of continued immunity; the circumstances must rather be considered a standing menace to health and life. An immense number of stones may be passed with no apparent failure of health. Calculi having been passed, and new stones not forming, complete recovery takes place.

Nephrolithiasis is intensely chronic, and a perfect cure is the exception rather than the rule.

Treatment.—The management of an attack of renal colic consists of the use of the hot bath, local application of hot poultices, or of cloths wrung out of hot water and changed rapidly. Morphine should be given hypodermically, *at once*, and until narcosis is well established inhalations of chloroform and ether should be employed. The writer has passed through two attacks of renal colic without taking morphine, and is prepared to affirm the extreme folly of such a course. At the same time, hot drinks should be given freely. It is stated that inversion of the body is often followed by immediate relief, the calculus dropping back into the renal pelvis. C. A. Walton claims that the introduction of a sound or catheterization during renal colic first, but only for a moment, increases the pain, but is followed by permanent relief in a few minutes, and sometimes at once. The acute attack having passed, the patient should be kept quiet until he has thoroughly recovered, and must be cautioned ever after to avoid violent physical exertion, especially heavy lifting. The kidneys should be freely flushed, and to that end pure distilled water should be used. It is well to drink daily between meals from two to three pints of distilled water, to which bicarbonate or citrate of soda in small amounts may be added. Wood and Fitz highly recommend the following formula:

℞, Lithii benzoat.,
 Lithii bicarbon., āã grs. xv.
 Potassii bicarbon., grs. xx.

Aquæ acid. carbonici, O. I.
 Misce et dispensa in siphone.

Of this, two pints are to be taken daily.

The diet is that of the early stage of gout.

It is still an open question whether, or not, the so-called solvents are of the slightest value. Experiments made with piperazine outside of the body justify the hope that it has some virtue as a solvent, and it is the fashion now to prescribe it for this purpose, fifteen grains daily in divided doses in an aqueous solution, continued for a considerable period of time. Hale states that boro-citrate of magnesia in doses ranging from five grains of the crude salt to five grains of the first decimal trituration given in large quantities of pure water will disintegrate phosphatic and calcareous stone in the kidneys. It is possible that the persistent use of alkaline solvents, whether piperazine or potassium citrate, may result in a deterioration of the general health and a deposit of phosphates about the calculus.

Whenever there is proof that the presence of a calculus in the kidney is producing serious effects upon that organ, operative interference, as extraction of the stone or removal of the affected kidney, must not be postponed too long.

The exhibition of the "homœopathically" indicated remedy for the relief of renal colic is not only a waste of time but involves an inexcusable misapplication of a meritorious principle. No remedy can possibly affect curatively the distress caused by the pressure of a rough calculus in the ureter slowly forcing its way downward toward the bladder, and which will not cease until the instant this passage has been accomplished. It may be urged that remedies like *CANTHARIDES* may and do control special symptoms, such as the urinary irritation, or that *TABACUM* may relieve the deathly nausea and sickness which so often result from the intense suffering; but prescribing of this sort bears slight resemblance to the selection of a remedy from the totality of symptoms and for the purpose of curing a morbid condition. On the other hand, the properly selected remedy, exhibited at the proper time, may accomplish much toward bettering the general condition of the patient and toward so regulating the functions of the system that the danger of calculus-formation shall be lessened and possibly removed. Thus *LYCOPodium* is to be considered when the amount of urine is

scanty, and there is constantly present a red, sand-like deposit. There may be considerable dysuria and vesical irritation. Its value in the so-called uric acid diathesis has been abundantly demonstrated. It is thought to have a preference for the right kidney.—BERBERIS in provers has caused marked urinary symptoms, nearly always with deposits of mucous sediment, containing a bright-red mealy substance. It has also pain, soreness and burning in the urinary tract, with pain extending into the hips and loins. Clinical experience has proved its value in the lithic diathesis.—BENZOIC ACID is useful in gouty conditions; the sediment in the urine is rich in phosphates.—OXALIC ACID has marked irritation of the bladder; "urine passed in the morning and evening very acid, deposits of numerous crystals of uric acid, indications of oxalate of lime in the milky white sediment. Urine loaded with enormous crystals of oxalate of lime, containing also some blood disks." Pain in the renal region, in some provers extending into thigh and leg.—OCIMUM was used by Dunham for the uric acid diathesis, with large deposits of red sand, particularly if the patient was subject to pain in the ureters. Turbid urine with a white and albuminous sediment, cramping pain in the kidneys, renal colic and vomiting; urine red, with brick-dust sediment or discharge of large quantities of bloody urine or thick, purulent urine.

Consult also ARSENIC, ASPARAGUS, NUX VOMICA, SARSAPARILLA, UVA URSI, PAREIRA BRAVA.

TUMORS OF THE KIDNEY.

Tumors of the kidney are benign or malignant. The former (fibroma, lipoma, angioma, myxoma, adenoma) are of slight clinical importance; the malignant growths are sarcoma (including myosarcoma) and carcinoma. Both cancer and sarcoma may be primary or secondary. If primary, they are rarely found at birth, more often early or late in life, and more frequently in males than in females.

The symptoms of malignant disease of the kidneys are rarely well defined. Frequently there is no pain from first to last; if present, it is of a dragging character, usually felt in the flank, and radiating down the thigh. Hæmaturia is an early symptom; it may be intermittent or continuous, slight or sufficiently copious to prove fatal. The blood escapes fluid or clotted, and

often constitutes perfect blood casts of the pelvis and ureters, which are of great diagnostic value. The passage of these clots may be very painful. Emaciation is progressive, rapid and pronounced. The recognition of the tumor is important and can usually be accomplished by bimanual palpation. If small, especially on the right side, it may be freely movable; large tumors may be slightly movable, but oftener are fixed. If its growth has been attained rapidly, a degree of fluctuation may be observed and the aspirator used to determine the character of its contents. The shape of the tumor and its location in the lumbar region may suggest its identity. It is overlapped by both liver and spleen, with coils of intestine separating it from these organs. The colon crosses the tumor and may usually be recognized without difficulty, establishing an important diagnostic point.

Diagnosis.—*Enlarged spleen* is recognized by its mobility, the distinctness with which its edges are outlined, and the presence of the characteristic notch or notches. *Tumors of the liver* and distended gall-bladder are freely movable and are not overlaid by the colon; usually, in renal tumor, a zone of resonance exists between its upper margin and the ribs. The differentiation between retroperitonæal sarcoma and renal disease, in children, is practically impossible when the tumor is large; of the two, the sarcomatous tumor is less movable.

Progressive and marked cachexia, with no apparent cause, and severe pain in the renal region suggest the possibility of renal cancer, even if there is no tumor and the urine appears normal; hæmaturia, however, is almost sure to occur sooner or later.

Prognosis.—Although involvement of only one kidney makes extirpation a practical operation by, at least, prolonging life, the prognosis is invariably hopeless, death usually occurring within a year after recognition of the disease. Death takes place from exhaustion or from rupture of a blood-vessel, or from gangrene of the tumor.

Treatment consists of measures for the relief of pain, nourishing diet, and endeavors to render the patient comfortable. Remedies must be selected upon symptomatic indications. Extirpation of the kidney for malignant disease has proved a very unsatisfactory operation, with immediately fatal results in nearly one-half of all the cases.

CYSTS OF THE KIDNEYS.

Cysts may occur in an otherwise healthy kidney or when the kidney itself is diseased. They are nearly always bilateral, but one kidney is pretty sure to be larger than the other. They may be solitary or multiple. The former vary in size from that of a marble to a small orange, but may become sufficiently large to constitute an abdominal tumor capable of causing mischief by mechanical interference. Multiple cysts may occur in very large numbers; they are usually small, but may fuse and constitute several large cysts, filled with a serous, sometimes colloid, fluid containing albumin, cholesterine, triple phosphates, fat drops, traces of blood, rarely urea or uric acid. Multiple cysts are a feature of chronic fibrous nephritis. Of especial interest is the *congenital cystic kidney* in which the kidney is largely represented by a great mass of small cysts, containing a thin, clear or turbid, occasionally dark red fluid in which are found albumin, urinary salts, cholesterine, blood, and fat. The kidney is much enlarged, not infrequently weighing from six to eight pounds, and when occurring in the foetus may materially interfere with labor. In rare cases cystic disease in the kidney is associated with cysts in the liver and, sometimes, spleen. The real cause of the cystic formation is not known; it originates in a dilatation above an obstructed point in some part of the uriniferous tubules or at their point of origin in the Malpighian bodies. In congenital cystic kidney (multilocular cystic kidney) the fault undoubtedly lies in defective development.

The symptoms of cystic kidney are necessarily vague. As stated, cystic formation may exist in an otherwise normal kidney, and unless sufficiently large to constitute a tumor of considerable size, the presence of which alone must disturb other organs, it may cause no symptoms whatever. In other cases the symptoms are those of cirrhotic kidney, with arterial tension and hypertrophy of the left ventricle. Or cystic kidney may exist indefinitely without being suspected, when suddenly symptoms of chronic Bright's disease develop; an exact diagnosis may be difficult even then. There may be a sudden attack of uræmic poisoning or fatal heart failure. The congenital form usually results in death of the foetus in utero or soon after birth. Exceptionally the child may reach mature years,

with the strong probability that sooner or later the difficulty will become a source of grave trouble.

The diagnosis rests upon the presence of a bilateral tumor in the lumbar region, with copious discharge of abundant and albuminous urine of low specific gravity.

Treatment, medicinal or surgical, has proved entirely unsatisfactory.

PERINEPHRIC ABSCESS.

Suppuration of the connective tissue surrounding the kidneys rarely occurs from exposure to cold, but is nearly always the result of an injury (blow, wound) or of extension of inflammatory and suppurative processes from neighboring organs (intestines, pleura, caries of the spine, abscess of liver, etc.) or of inflammation of the renal pelvis, kidney or ureter. It is more frequent in adult life, but is occasionally seen in children, usually as a sequel of some one of the exanthematous fevers.

Symptoms.—The onset of the disease may be insidious, in view of its association with primary affections which have daily fever and symptoms likely to mask for a time inflammation extending into the connective tissues about the kidney. The formation of pus, however, is marked by symptoms which may not be overlooked. There is pronounced rigor, followed by irregular fever, with a temperature often rising to 104° or 105°, and profuse sweating. The pulse is rapid, bounding or feeble. There is furred tongue, loss of appetite, constipation and, when not sweating, hot, dry skin. Pain is slight or even absent in exceptional cases. Usually there is severe pain in the lumbar region, with aggravation from motion or pressure. It may be referred to the region of the hip-joint and extends into the thigh and testicle; the latter may be retracted. The patient lies with flexed thighs and finds it painful and difficult to adduct the thigh; when walking, he seeks to throw his weight upon the unaffected side and assumes a stooping posture. The urine is clear unless the kidney or renal pelvis is primarily involved. The tumor is at first hard, then develops deep fluctuation, which eventually becomes superficial. The pus cavity formed is usually large and extensive, and may extend from the level of the liver and spleen to the iliac fossa, and far enough

forward to cause protrusion of the abdomen. The abscess opens externally by ulceration, or burrowing of pus may take place, an exit being found in the groin or at Poupard's ligament; or there may be perforation with rupture into the intestine (colon or duodenum), bladder, vagina, renal pelvis, peritoneal or pleural cavity. The pus usually is offensive, and may have a distinctively fæcal odor. Its evacuation is followed by rapid fall of temperature and general improvement. In some cases gangrene and sloughing occur.

Diagnosis.—Perinephric abscess is recognized by the existence of a deep-seated induration in the immediate neighborhood of the kidney on the affected side, between the last rib and the crest of the ileum. Bimanual examination rarely fails to reveal the presence of a distinct tumor. The constitutional symptoms indicative of pus formation are easily recognized, and fluctuation is in most cases readily detected. The use of the aspirator for diagnostic purposes suggests itself. In childhood *hip-joint* disease may be suspected, especially so since the pain is frequently referred to the knee; but in perinephric abscess there is no localized fulness and tenderness over the hip-joint and, usually, the pain is higher.

Prognosis.—The disease runs a fairly rapid course, from a fortnight to a month; it must always be considered very serious. The outlook is favorable when the abscess has burst outwardly or in such a way internally that it has completely emptied itself and allows of free drainage. Even when such is the case, however, much depends upon the character of the primary disease, the vitality of the patient, and the care he can have. If perforation does not take place, there is great danger of a fatal issue from blood poisoning. If recovery takes place, the destroyed tissue is largely replaced by the extensive formation of cicatricial tissue. Death results from exhaustion, blood poisoning, or amyloid degeneration.

Treatment.—The patient's strength must be sustained by generous diet and the judicious use of stimulants. The presence of pus demands early, free, and permanent drainage; for this purpose a free incision is unavoidable. The use of such remedies as ARSENIC, CHININUM ARSEN., SILICA, HEPAR SULPH., and others which stand in close relation to suppurative processes, at once suggests itself.

DISEASES OF THE BLADDER.**CYSTITIS.**

Ætiology.—Cystitis or catarrh of the bladder is a common affection, due to any one of a large number of possible causes. It not infrequently occurs in the course of infectious diseases, the noxious material affecting the entire urinary tract, the result of efforts at elimination made by the kidneys; here belong typhoid fever, acute articular rheumatism, influenza, erysipelas, small-pox, etc. Many cases result from extension of inflammation from neighboring parts, as the urethra, rectum, uterus, vagina, or peritonæum; thus, gonorrhœal urethritis, especially in women, very frequently extends into the bladder. The extension downward of an existing pyelitis belongs here. Other factors are: the presence of a foreign body (stone); injuries from the use of some instrument or from the prolonged pressure caused by a fæcal mass, pessary or, occasionally, fœtal head during labor; the action of certain drugs which act as irritants to the urinary mucous membrane, i. e. turpentine, cubeb, cantharides, copaiba, etc.; the direct irritation caused by the presence in the bladder of the strongly concentrated urine found in gouty persons. Not infrequently cystitis arises from the introduction of a dirty or infected catheter or bougie. Partial retention of urine, due to prostatic enlargement or defective muscular contraction or imperfect closure of the sphincter, results in the formation of carbonate of ammonia, which is very irritating to the bladder and favors the development of bacteria. Exceptionally cystitis is due to taking cold.

Morbid Anatomy.—The mucous membrane is swollen, relaxed, of bright-red or deep-red color, and covered with a thick, slimy, grayish, muco-purulent secretion. The tops of the rugæ are in part denuded of their epithelium, and pus and loose cells are found in the sulci between the folds. If the inflammation be more severe, the swelling of the mucous membrane is more pronounced, the destruction of its epithelium more extensive, and the submucous tissues are thickened. Occasionally large parts of the lining membrane are thrown off, especially in cystitis due to retention or over-distension.

If croupous or diphtheritic, fibrinous clots are present, with

ecchymoses, ulceration, and superficial necrosis, especially abundant at and near the neck of the bladder and upon projecting folds of the vesical mucous membrane. It is usually seen in patches of varying size, very rarely covering the entire surface. Suppuration may occur in the submucous connective tissue or between the muscular and serous coats, frequently resulting in the formation of small abscesses, more often a single abscess, located near the neck and eventually discharging into the bladder. In rare cases the pus is diffused through the connective tissue of the coats of the bladder. Gangrenous disorganization sometimes takes place, in which case there is extensive destruction of mucous tissue, possibly involving the deeper structure; the mucous membrane appears dark, charred, gangrenous, and the submucous connective and muscular tissues are softened and infiltrated with foul, bloody pus. Ulcers of varying shape are found, more often about the neck of the bladder. They sometimes are circular, with well-defined margins, sometimes irregular in outline, with ragged borders; they may perforate into the abdominal cavity or adhesive inflammation may take place. In chronic cystitis the mucous membrane appears slate-colored, grayish-black, and may be found incrustated with urinary salts, especially ammonio-magnesian phosphate; the urine contains pus or muco-pus.

Symptoms.—Acute cystitis may begin with or without chill and fever. Pain is usually one of the first and most persistent symptoms. It is centered in the region of the bladder, and may involve the perinæum and rectum. Its greatest intensity is associated with the act of voiding urine, and it is somewhat relieved when the bladder has been emptied. There is a tormenting urging to pass urine every few minutes, the act being characterized by intense vesical tenesmus or strangury, the patient straining with all his might in spite of the intense pain caused by the effort; only a small amount of urine is passed at a time, often followed by a few drops of blood. In some cases painful reflex spasms of the sphincter result from the irritability of the mucous membrane. The *urine* is almost normal in amount during the twenty-four hours; it usually looks clear, but deposits a copious sediment containing pus, bladder epithelium, and bacteria; in addition to these, there are shreds of necrotic tissue if the cystitis is diphtheritic or gangrenous, and blood

corpuscles and blood-clots if there has been hæmorrhage. Frequently the urine is high-colored; it may be acid or alkaline, sometimes neutral, in reaction. If not examined until after it has stood for some time, it may be strongly alkaline and of decided ammoniacal odor, readily depositing the coffin-lid crystals of ammonio-magnesian phosphate and urate of ammonia crystals. The so-called "mucous cloud" in the urine is noticed in mild cases, and consists of a grayish sediment which holds particles of slime, polynuclear leucocytes, cells of vesical epithelium, occasionally red blood corpuscles, and often a multitude of bacteria. The sediment of the urine in severe cases frequently is very viscid and may be drawn out into long threads, because of its richness in albumin from the solution of abundant pus corpuscles and epithelium in the alkaline urine. *Fever* usually accompanies even a moderately severe cystitis. It may be very high and even threatening when there is extensive suppuration or necrosis, or when the kidney is involved, or when there is extension of the inflammation into pericyclic tissues. Such cases are often characterized by severe nervous symptoms, as headache, dizziness, nausea, and may terminate in delirium, somnolency and stupor.

The formation of an abscess is indicated by a localized induration with great pain and tenderness, which may be easily detected by examination per rectum. The abscess may break, with immediate relief of symptoms, or cause peritonitis by extension of inflammatory action.

In mild cases of acute cystitis the fever, pain and tenderness grow less in a few days, the urine becomes normal, and recovery takes place early. The more protracted the course, the more serious the outlook and the more doubtful the prognosis, especially in case of extension of the disease to the kidneys or adjacent fibrous tissue. *Chronic cystitis* is characterized by increased frequency of urination and, often, pain. The urine is cloudy and contains some pus cells. There may be some suprapubic uneasiness. The general health does not suffer, save in unusually severe and prolonged cases or unless associated with a serious primary disease, as stricture or calculus. Henry Thompson states that the "well-known glary mucus which is deposited so abundantly from the urine in some cases, in elderly people almost invariably, appears only in those whose urine is

abnormally retained, through atony of the vesical walls, or in consequence of enlarged prostate, or as the result of sacculatation of the bladder." Chronic cystitis frequently proves incurable, since often it depends upon diseases which are beyond the reach of help, as paralysis of the bladder from affection of the spinal cord.

Treatment.—The patient should be put to bed at once and kept there until well; by this means alone the danger of a protracted attack is greatly lessened. The hips should be slightly raised and the knees bent over a pillow. The bowels should be opened by a hot enema or Epsom salts. The diet must be light and non-irritating; milk may be used freely or exclusively. Spices, alcoholic stimulants, etc., are forbidden. Pure water should be drunk freely to wash out the bladder. Hot decoction of triticum repens, or linseed tea, or barley water are excellent. The patient should be directed to restrain as long as possible the desire to empty the bladder in order to avoid the pain and the additional irritation caused by the effort; to aid in this, suppositories containing one grain of the extract of opium and one-fourth grain of the extract of belladonna are useful. If the urine is strongly alkaline or ammoniacal, drinks containing boric or benzoic acid should be used; if strongly acid, drinks containing alkalies are useful. Much benefit may be derived from hot sitz baths taken several times a day, and from the application over the bladder of cloths wrung out of hot water, to which hops may be added. Catheterization has been strongly recommended, but it involves so much pain and may so readily increase the existing irritation that it should only be practiced when residual urine is in the bladder. The remedies chiefly used by the dominant school are: chlorate of potash, in watery solution, from forty to seventy-five grains per day, never on the empty stomach; salicylic acid, from thirty to sixty grains per day, in ten-grain capsules; arbutine, the active principle of uva ursi, from forty to sixty grains per day in a watery solution, or the decoction of uva ursi.

The treatment of *chronic* cystitis demands above all the removal of residual urine by catheterization and frequent washing out of the bladder. For the former, a soft rubber catheter should be used, kept in a weak bichloride solution and carefully cleansed in hot water before it is put away. If the case is se-

vere, or if there is much pus and mucus, or the urine is ammoniacal, injections should be made into the bladder; these will remove any urine still retained in pouches, will cleanse the walls of the bladder, wash away sediment, and aid in restoring the lost natural contractile power of the organ. When injections into the bladder are made, the urethra should be disinfected with a weak bichloride solution (1:4000), then warm water should be introduced into the bladder, very slowly and with a steady, continuous flow, not more than two or three ounces at a time; this must be kept up until the fluid returns clear. If it is desired to use medicated injections, they must not be introduced until the bladder has been thoroughly washed out, and must not be allowed to remain in the viscus for more than three or four minutes. For this purpose a fountain syringe, provided with a two-way stop cock may be used. Thus the inflow of fluid may be stopped by turning the appropriate cock as soon as the patient experiences a sense of distension of the bladder; the bladder is then allowed to empty itself, after which another injection may be given, to be repeated until the object has been attained. After the bladder has been thoroughly washed, the medicated injection is administered in the same manner. The favorite injections are: acetate of lead, 1 to 1000; permanganate of potash, 1:1000; corrosive sublimate, 1:15000; carbolic acid, 1:500. Solutions of boric or salicylic acid have proved useful. Many practitioners still advocate the superiority of nitrate of silver in $\frac{1}{2}$ to 2 per cent. solution; if the strong solution is employed, it must be used very carefully, beginning with the weaker solution and in small amount. Many cases have derived material benefit from drinking copiously of a decoction of *triticum repens*, boiling from two to four ounces of the root in a pint, or more, of water. The patient must always be warmly clothed, wearing woolen underwear both summer and winter.

Treatment of necessity embraces attention to the primary disease, as the presence of stone or stricture, and the intelligent management of a paralytic condition of the bladder which may be responsible for the existence of the vesical catarrh.

Therapeutics.—**ACONITE.** From exposure to cold. High and characteristic fever. Burning at the neck of the bladder when urinating and after urinating. Severe tenesmus and burning.

Urine scanty, dark and hot. Retention of urine in infants; they reach with their hands to the genitals and cry out.—*APIS MEL-LIFICA*. After poisoning with cantharides, camphora and other irritants. Great vesical irritability; when urinating, stinging pain and vesical tenesmus. Urine high-colored, rarely bloody, sometimes retained.—*BELLADONNA*. Frequent painful urination; great sensitiveness of the bladder and hypogastrium to touch and jar; urine hot, burning; at first clear, it becomes turbid on standing, then deposits a red, bran-like sediment. In very acute cases, after *ACONITE* has failed to bring about improvement.—*CANNABIS SATIVA*. In cystitis associated with gonorrhœal urethritis. Burning, biting pain from the urethra into the bladder when urinating; frequent urging; urine scalding and bloody, great irritability of the vesical sphincter.—*CANTHARIDES*. Frequently indicated; it covers all the symptoms of severe inflammation of the bladder. Constant urging to urinate, with much straining, the urine passing drop by drop, or in a thin stream, with frightful burning and strangury. Severe burning, scalding pain at the vesical neck, extending to the glans penis or testicles, which are retracted, or into the perinæum and rectum. Urine scanty, high-colored, bloody, albuminous, containing shreds of membrane. Useful in the severest forms of cystitis, with violent constitutional symptoms, as distended, hard, painful abdomen, nausea and vomiting, uncontrollable thirst, high fever. He cannot stand on his feet for a moment without intense urging to urinate. In some cases the patient is tormented by violent and painful erections. In cases connected with renal inflammation.—*CHIMAPHILA*. "Catarrh of the bladder, both acute and chronic, especially indicated when the urine is offensive, turbid, containing ropy or bloody mucus, and depositing a copious sediment, with burning and scalding during micturition and straining afterwards; it is very difficult to begin to urinate, the patient strains a great deal, urine sometimes fetid; concomitants of chronic cystitis." (T. F. Allen.)—*COPAIVA*. Great difficulty in making a little water; dysuria; much urethral inflammation and soreness and swelling and soreness of the urethral orifice. Constant urging to urinate. Bloody urine. Urine smells of violet. Gonorrhœal urethritis. More frequently useful in chronic cases.—*EQUISETUM*. Pain and tenderness in the region of the bladder, with sense of

painful distension. Frequent and painful urging to urinate, worse after the urine has passed. Urine contains some mucus and blood.—*EUPATORIUM PERFOLIATUM*. Much backache, in the renal region; sore pain all along the spine, from below upward; constant urging to urinate, with biting and burning in the urethra.—*MERCURIUS*. Of great value when associated with renal disease. Burning and tenderness; pain in the back; burning after urinating; urine may contain pus, blood, shreds. In diphtheritic cystitis (*MERC. CYNAT.*; *MERC. CORROSIV.*) with vesical symptoms of sufficient severity to suggest *CANTHARIDES*.—*NUX VOMICA*. In subacute and chronic cases. The bladder is quite irritable; the efforts to urinate are frequent and painful from strangury. The amount passed is scanty; burning in the urethra when urinating; contractive pain in the urethra after urinating; urine high-colored, sometimes bloody; of great value in chronic cystitis depending upon paralytic trouble.—*PULSATILLA*. In mild forms. During pregnancy or associated with prostatic enlargement or suppressed gonorrhœal discharge. Spasmodic pains extending to the hips and thighs. Sensation of distension and fulness in the bladder; slight or no pain in the urethra. Profuse mucous sediment in the urine.—*TEREBINTHINA*. When associated with inflammation of the kidneys resulting from an acute infectious disease. Much dull burning pain in the region of the kidney, extending into the bladder; vesical tenderness; the urine deposits a thick, slimy sediment and contains much blood. Tenderness of the hypogastrium.

Hale states that "two of the best palliatives of the agonizing pain in cystitis are corn-silk (*STIGMATA MAIDIS*) and *HYDRANGEA* in doses of from ten to twenty drops of the tincture every hour or two."

Chronic cystitis.—In spite of the fact that mechanical treatment, as above described, is of the greatest importance, the exhibition of the proper remedy may materially aid in curing the case or, if that is impossible, in rendering the patient's condition much more comfortable than it otherwise would be. Remembering the varied and serious character of the primary affection, it is evident that a list of possibly indicated remedies would be large. The following are the most important: *BENZOIC ACID* (benzoate of ammonia). Offensive urine with granular mucus and phosphates in the sediment; urine scanty, dark-

red or brown, bloody, ammoniacal, of foul odor; rheumatic tendency.—*CONIUM*. Partial paralysis of the bladder; the urine flows by fits and starts, easier when standing.—*CUBEBA*. Sense of cutting and constriction while urinating; hæmaturia; in women with inflamed urethra, who must urinate every little while, with smarting, tenesmus and ropy mucus.—*DULCAMARA*. From cold. Nephritis. Urine milky, thick, turbid, slimy, voided with burning in the urethra. Sometimes vesical tenesmus; occasionally involuntary voiding of urine.—*EPIGEA REPENS*. “Dysuria; tenesmus vesicæ after micturition; burning in the vesical neck when urinating; bloody sediment; urine contains mucus and pus.” (Doughty.)—*EUCALYPTUS*. An excellent remedy. The urine is scanty and foul-smelling, with copious muco-purulent sediment. Burning when urinating. “Even useful when there is urinary fever, with chills in the afternoon, hectic and night-sweats.” (Hale.)—*HYDRASTIS*. Urine smells as though decomposed; thick, ropy mucus in the urine.—*LYCOPODIUM*. Milky deposit of bad odor. Uric acid diathesis; gravel; retention of urine; in children.—*PAIREIRA BRAVA*. Useful in acute, but especially in chronic, cystitis. Much violent straining, with scalding in the urethra. Urine ammoniacal and contains a great deal of thick, white mucus.—*POPULUS TREMULOIDES*. Vesical catarrh of old people, with much tenesmus, urethral soreness and tenderness, with scalding when passing urine; urine contains mucus and pus.—*UVA URSI*. “Frequent urging, with severe spasm of the bladder, burning and tearing pain; urine contains blood and tough mucus, which can be rolled out of the vessel in large masses.” (T. F. Allen.)

Consult also: *NUX VOM.*, *PULSATILLA*, *COPAIVA*, *CHIMAPHILA*, *ARSENIC*, *COLOCYNTHIS*, *CALCAREA CARBON.*, *KALI BICHROMICUM*, *LACHESIS*, *SEPIA*, *SULPHUR*.

ENURESIS (Incontinence of Urine).

Inability to retain the urine is a common affection in young children, before the age of puberty; it is not infrequent in women, but rare in men. In a general way it depends upon either weakness of the sphincter, possibly congenital, or upon an abnormal irritability of the detrusor. Special causes are: paralysis of sphincter or compressor urethræ muscle from cere-

bral or spinal lesion; enlargement and separation of the median lobe of the prostate, opening the meatus internus; injuries to the vesical neck or urethra, such as may occur in the course of operations or from a fall or blow; loss of substance of the vesical neck from ulceration; hyperæsthesia of the bladder or of parts of it and of the prostatic urethra from acidity of the urine or from sympathy in affections of the kidneys, rectum, vagina, uterus, or glans penis. To the latter class belongs the irritation often found in boys who have a redundant or adherent prepuce, particularly when the preputial orifice is contracted. In children, nervous affections (as chorea or epilepsy), intestinal worms, masturbation, general irritability of the nervous system and conditions which result in polyuria are commonly associated with incontinence of urine.

In children the affection almost always takes the form of wetting the bed at night. Usually this occurs toward morning, after a considerable amount of urine has accumulated in the bladder; but it may occur at any time after the child has fallen into a sound sleep, and rarely arouses the patient. In severe cases the accident may take place during the day, the little patient, if a desire to urinate is experienced, being unable to reach a place where he can relieve himself. In adults, especially in women, no trouble is experienced while the patient remains perfectly quiet; but a varying amount of urine escapes upon a sudden movement or upon coughing or sneezing. In other cases the patient has simply lost volition, the bladder emptying itself when full. In the worst form, caused by mechanical causes or organic lesion, the urine escapes in a continual stream, as fast as it reaches the bladder.

Children nearly always recover as they grow older. The removal of the cause or intelligent medication usually effect a prompt cure. Exceptionally the condition persists beyond puberty, and then becomes a source of great annoyance and a serious affliction, especially to young girls; in these cases the trouble may cease after marriage. In adults the prospect of cure is much less encouraging than in children, since the cause of the affection is usually deep-seated and beyond reach.

Treatment.—In children attention must be paid to the diet, excluding from it a too generous allowance of sweets and acid fruits. The evening meal should be light. The child should be

taken up occasionally in the night and placed upon the chamber. If troubled with "worms," the parasites should be removed by proper treatment. The clitoris of a little girl, if bound down or tightly hooded, must be placed into a normal condition and circumcision be performed upon boys if occasion for it exists. A normal life in the open air will prove of material help to adults and children. Electricity may be very helpful, but as yet much difference of opinion exists concerning the best method of applying it and the result to be expected. If there is weakness of the vesical center in the spinal cord, galvanism is passed from the lumbar spine to the perinæum; when enuresis results from irritability or excitability of the detrusor muscle or from weakness of the sphincter, the faradic current, applied in the same manner, is preferable. Jacobi prefers to introduce one electrode from an induction apparatus into the rectum, placing the other, the sponge electrode, on the raphé perinei; passing a weak current, just bearable, for five to ten minutes, repeating daily for four to six weeks. "In reality it is probably better to combine the two forms of electricity. The galvanic current should be used not as a sedative, but to improve the nutrition of the sphincter muscle. Then—but coincidentally—the muscle should be stimulated to contract by the faradic current, and thus exercised in the performance of its function. A daily seance is necessary, preferably at bed-time" (Jacobi). Many cures with the homœopathically indicated remedy have been reported, the number of remedies employed embracing a long list, because a relation, homœopathically, to the primary cause is a necessary condition to a cure. Thus, if enuresis is of purely nervous origin, CHAMOMILLA, GELSEMIUM, IGNATIA, NUX MOSCHATA, ASA FŒTIDA, HYOSCYAMUS, PHOSPHORUS, PHOSPHORIC ACID and others of the same class are to be studied; if the result of debility, CHINA, ARSENIC, FERRUM PHOSPHORICUM, IODINE and SULPHUR will be specially important; if connected with a lithæmic tendency, this fact will point to LYCOPodium, BENZOIC ACID, LITHIUM, BRYONIA, BERBERIS, COLCHICUM, RHUS, PHYTOLACCA.—BELLADONNA. Sphincter paralysis; dark, offensive urine; starting and crying out aloud during sleep; irritability of the bladder.—CAUSTICUM. Paralytic weakness of the bladder; urine expelled very slowly and incompletely. Enuresis in the early part of the night and dur-

ing the day from the slightest excitement. Involuntary spurt-
ing of urine when coughing. Paralysis of the bladder after
labor.—CINA. In children troubled with worms; wants to uri-
nate every little while both day and night.—EQUISETUM. Much
vesical irritation; incontinence of urine in old men; “weakness
of the bladder, dribbling in insane people who will not attend
to the bladder.”—FERRUM PHOSPHORICUM. Urine deposits a
whitish sediment. Child appears weak, backward, does not
thrive; complains much of headache; constantly wets itself.—
GELSEMIUM. Paralytic condition of the bladder in children
after diphtheria, in old people.—HYOSCYAMUS. Child cannot
urinate when it wants to do so; immediately after, involuntary
escape of urine. Paralysis of the bladder.—PULSATILLA.
Child of mild, tearful disposition; averse to, and incapable of,
severe muscular exercise; incontinence from weakness of blad-
der, both day and night; when walking about or playing;
when coughing.—SEPIA. Enuresis, especially in the early part
of the night. The urine deposits a red sediment which adheres
tightly to the vessel.

PART XI.

DISEASES DUE TO ANIMAL
PARASITES.

PART XI.

Diseases Due to Animal Parasites.

DISEASES DUE TO ANIMAL PARASITES.

Animal parasites, greatly differing in structure and habits, enter the human system and may there become a source of more or less serious, even fatal, disease. The larger number of these parasites enter the body in the food and drink; they may remain in the intestinal canal or migrate to any part of the body, and there give rise to constitutional disturbances; or they may infest the skin and, unable to migrate, cause symptoms of a purely local character.

PARASITIC PROTOZOA.

The protozoa represent the lowest form of animal life; several varieties are found in the human body.

Amœbæ.—Of these, the *amœba coli* or *dysenterica* occurs extensively in dysentery; amœbæ have also been found in the urine, usually with hæmaturia, with or without nephritis.

Sporozoa.—The *sporozoa* (psorosperms or gregarinidæ) are, as a rule, parasites of the cell (*cystozoa*) and are closely related to the *hæmatozoa* or blood parasites. The *coccidium ovi-forme*, one of the commonest varieties, occurs in rabbits and many domestic animals, as cats and dogs, and has been found in man. The young amœboid coccidia enter the mucous membrane of the intestines and of the bile-ducts, and there encapsulate, developing numerous spores within the capsule; when the capsules break, the spores are set free and either multiply freely or make their way to other parts. The mass of capsules, in the

liver of the rabbit, form whitish nodules throughout the organ, of the size of a pin's head to a split pea; those found in man in appearance suggest tuberculous nodules.

The presence of sporozoa in man gives rise to *Psorospermiasis*, which may be internal or cutaneous. In the former, collections of the parasites are found in the liver, spleen, kidneys, ureters, intestinal mucous membrane, myocardium, pericardium and in the pleuritic exudations. When found in the abdominal viscera, there is more or less fever, tenderness over the liver and spleen, often with presence of small tumors in the liver, nausea, diarrhœa, dry tongue, great nervous prostration. When the kidneys or ureters are involved, there is hæmaturia and frequent urination. Cases of internal psorospermiasis often prove fatal.

The cutaneous form is rare, but well authenticated cases have been recorded. Among others, two cases were reported in the Johns Hopkins Hospital Reports. In one of these the lesion remained local for nearly eight years, and had been considered tuberculosis of the skin. The lymphatic glands finally became involved, fever set in, and, later, cough, with purulent expectoration. After death the lungs, adrenals and testes, as well as the spleen, the surface of the liver and pleuræ, were found studded with nodules which appeared tuberculous, all containing enormous numbers of the sporozoa. The other case ran a rapid course, but presented the same features after death. *Paget's Disease of the Nipple* and *Keratosis follicularis* of White have been considered of parasitic origin; but it is thought probable that the changes observed are in reality a hyaline metamorphosis of epithelial cells. Speculations of possible parasitic origin are entertained in reference to molluscum contagiosum and epithelioma.

Infusoria.—Of these, the *Trichomonas* or *Cercomonas hominis* and the *Megastoma entericum* or *Lamblia intestinalis* are found chiefly in the intestines under a great variety of conditions; they have also been seen in the urine, in pulmonary gangrene, in the gangrene of bronchiectasis, and in pleurisy. The *Trichomonas vaginalis* is found in acid vaginal mucus.

Of the ciliated infusoria the *Balantidium coli* is often present in the large intestine in dysentery. As yet, it is not known whether, or not, it is pathogenic; in carefully observed cases

the frequency of the stools was always associated with an increase of the infusoria in them.

HELMINTHIASIS.

This term covers the disturbances caused in man by the presence of verminous parasites.

TAPE-WORMS.

Tape-worm or *tænia* belongs to the Cestodes. Several varieties are known, of which *Tænia solium* and *Tænia saginata* are the most important.

Tænia solium (pork tape-worm) is from six to ten or twelve feet long, has a round head, not as large as a pin's head, armed with a double row of hooklets (armed tape-worm) and provided with four suckers. The neck is very narrow, thread-like; as segments (proglottides) form, the neck becomes transversely grooved; the segments, some three feet from the head, are square, not elongated. The segments from the four hundred and fiftieth downward are mature; they contain both male and female generative organs; pressed between two plates of glass, the uterus is easily seen, in the form of a central trunk, with eight or ten lateral branches on each side; a slight projection on the border of the segment constitutes the genital opening, from which thousands of eggs may be pressed as an opaque fluid. Each egg consists of a hard shell containing a little embryo armed with six hooklets. The mature segment is about one centimetre in length and from six to seven millimetres in width. Segments are freely passed with the stool after the parasite has become three or four months old; as passed, they are often misshapen, fused, or perforated. The parasite lives in the middle of the small intestine, to which it fastens itself by its hooklets. Usually there is but one tape-worm domiciled in the intestine; but several, even many, may exist in the same individual. The worm may float in the intestine, with the head uppermost, or may be knotted together in a mass; if the number of parasites is large, and they are knotted, they may fill the lumen of the gut. Occasionally reversed peristalsis results in masses being vomited up. The eggs, to insure their further

development, must be taken into the stomach of a mouse, dog, sheep, swine or rat; this done, the shells are digested and the embryo set free, passing into various organs (brain, liver, muscle, even the eye) where the larva or cysticercus is developed; the larva, when swallowed, becomes a tape-worm.

Tænia solium is comparatively rare in America; it is very common in countries in which pork is used freely, especially raw or insufficiently cooked (Germany; Asia).

Tænia saginata, the unarmed or beef tape-worm, is common in America and in countries where beef is extensively eaten. It differs structurally from the *tænia solium* in the following: it is larger, measuring from fifteen to twenty feet, or more; its head is larger, measuring about two millimetres in breadth; the head is square-shaped and provided with four large suckers, but it has no hooklets; the ripe segments are from 17 to 18 millimetres long and from 6 to 8 millimetres in width; the uterus consists of a medium stem, with 15 to 35 lateral branches, which leave the median stem in pairs; the ova are larger and their shell thicker. The parasite clings to the intestinal wall by its suckers; segments are passed as with *tænia solium*; they are ingested by cattle, in whose flesh they develop into cysticerci; meat thus infected and eaten, unless thoroughly cooked, causes tape-worm in man.

Other and rare varieties are: *Tænia elliptica* or *cucumerina* (*Dipylidium caninum*), sometimes found in young children and infants; common in dogs and cats; embryos harbored in lice and fleas. *Tænia flavo-punctata* (*Hymenolepsis diminuta*), in rats and mice; eggs in insects; found in small children; only a few cases. *Tænia nana*. Very rare in children. *Tænia Madagascariensis*, an Eastern *tænia*, very rare.

Bothriocephalus latus or fish tape-worm, from 15 to 25 feet long, with club-shaped head with two lateral grooves, no suckers, no hooklets; segments broad and short. Eggs escape directly into the intestine and are further developed in the water; they are swallowed by pike, salmon and other fish; the mature worm grows in persons who eat the fish raw or improperly cured. Common along the Baltic, in Switzerland and Italy. The *B. cordatus*, *B. cristatus*, and *B. liguloides* are very rare specimens.

Symptoms.—Tape-worm is found in man at any period of his

life. It may exist in man for an indefinite length of time and cause no disturbance whatever; its presence certainly involves very little danger. Often, however, there is distress in the stomach and bowels, with nausea and, occasionally, diarrhœa, possibly accompanied with slight fever, headache, moderate thirst and coated tongue. It is in persons suffering from these attacks that spells of ravenous hunger occur most frequently. Nervous disturbances are rare, save in persons of an apprehensive disposition who are conscious of harboring tape-worm; these soon become anxious, eagerly watch the slight deviation from perfect health, and suffer from symptoms of nervous irritability, even to chorea and convulsive action. In very rare cases convulsions and epilepsy have been observed.

The *Bothriocephalus* may give rise to serious anæmia, with palpitation of the heart, dyspnœa, emaciation, great loss of strength and death.

Diagnosis.—The diagnosis rests upon the evacuation of segments with the stool or their escape from the bowels at other times. It is said that they pass away freely when the patient eats abundantly of fruit and of salted, pickled or spiced food.

Treatment.—The prophylaxis consists of insuring that all meat used is thoroughly cooked, and in the proper care of any segments that may be passed. The latter should never be thrown away, upon the ground or into the water closet, but should always be burned.

The treatment proper is necessarily heroic, and, to be successful, includes faithful attention to certain preparatory measures. First of all, the intestines must be thoroughly emptied by mild laxatives and the use of a copious enema of cool water. The patient must be kept on a light diet, preferably milk, for at least two days before the tape-worm remedy is given. German practitioners still favor the eating of a finely chopped salad made of salt-herring, with onions and garlic, for the purpose "of making the tape-worm ill," and the wisdom of the practice is borne out by the success which usually attends it. The bowels having been thoroughly emptied, the patient is allowed no food during the night and in the morning, and is given the medicine in the early part of the forenoon. Its administration is followed in two or three hours by a brisk purge. By this means the parasite is left without the protection of fæcal matter and its expulsion is rendered probable.

Of drugs, the following are the most reliable: Male fern, in the fresh ethereal extract, is given in one- or two-drachm doses, in form of an emulsion or in milk, still better in a capsule, with the usual preparatory treatment and purge after the last dose has been taken. Large doses of the extract or oleoresin may, however, cause intense gastro-intestinal irritation, and fatal results have followed the exhibition of two drachms of the oleoresin, given in three doses, in a child 5½ years old. The bark of the Pomegranate root (*Punica granatum*) is a favorite tænicide. A decoction is made by macerating three ounces of the bark in twelve ounces of water, reducing the amount to one-half by evaporation, and giving a wineglassful every half hour until all has been taken. Its taste is exceedingly objectionable to some patients, but the medicine is very efficient. Its alkaloid, Pelletierine, a somewhat expensive substance, may be prescribed instead, in doses of one-fourth to one-half grain, repeated two or three times, to be followed in due season by a brisk purgative. The Pelletierine tannate, 15 grains at a dose, in capsules, is also very effective.—Koussou flower (*Brayera*) enjoys an extensive reputation. Struempell gives three or four powders, each containing seventy-five grains of the powdered flowers, in white wine, one glass of wine containing one powder, every half hour. The patient is directed to lie quiet to prevent vomiting.—Kamala, one to two drachms, mixed in molasses, has often answered the purpose.—Pumpkin seed (*Pepo*) deserves its long-established reputation, and has the advantage of being an easily obtained and inexpensive remedy. Three or four ounces of the fresh seeds should be crushed or pounded in a mortar, then beaten into a paste with milk, and allowed to stand for several hours; the resulting emulsion is strained and may be sweetened with sugar to render it palatable. It is taken at one dose and followed by a brisk purge.

The treatment cannot be considered effective unless the head of the tape-worm has been expelled; the head remaining, the worm will rapidly grow again. In many cases repeated attempts must be made before success is insured. This applies particularly to the *tænia solium*.

When a patient has passed through the ordeal of treatment for tape-worm, he should be kept quiet for some time and care

exercised in the diet. The treatment should never be undertaken save upon absolute proof, by the expulsion of segments, that tape-worm is really present.

CYSTICERCUS DISEASE.

This results from the presence of the larvæ of tape-worm in the-tissues of the body; observation shows that with very rare exceptions the larvæ are those of the pork tape-worm. In nearly every case the eggs are derived from the tape-worm of another host, though exceptionally ripe segments may enter the stomach of their host, as by violent vomiting, and the ova be set free, or, as may occur in the insane or in persons of unusually filthy habits, the eggs may be transferred from the anus to the mouth, thus constituting a species of auto-infection. The egg swallowed, its shell is digested and the embryo set free; the embryo enters the lymphatics or blood vessels and is carried to various parts of the body, where it eventually is transformed into a cyst of the size of a pea, or larger, containing a clear fluid. In the course of about three months a head, with suckers and hooklets, is developed. A capsule may form around the larva by surrounding connective tissue; if it have an abundance of room, as in the ventricles of the brain, it remains free. The cysticercus may live for many years and usually remains fixed; or the larva may die and become calcified. It may occur isolated or the body may fairly swarm with them. They are found in the muscles, brain, heart, lungs, kidneys, liver, eyes and bones.

The **symptoms** depend very largely upon the organ which is occupied by the parasite. If the brain or cord, chronic meningitis or hydrocephalus may result. In the ventricles of the brain they attain considerable size from the absence of surrounding tissue the pressure of which might restrict their growth. In the eye they occur in the vitreous humor, causing disturbances of vision. When the muscles are invaded in large numbers, there is muscular stiffness and helplessness. Under the skin they form smooth, round, elastic tumors, not projecting above the surface. Numbness and pain result in case of pressure upon peripheral nerves. Osler relates the case of a man who was admitted to his "wards stiff and helpless, so

much so that he had to be assisted up-stairs and into bed. He complained of numbness and tingling in the extremities and general weakness, so that at first he was thought to have a peripheral neuritis. At the examination, however, a number of painful subcutaneous nodules were discovered, which proved on excision to be cysticerci. Altogether seventy-five could be felt subcutaneously, and from the soreness and stiffness they probably existed in large numbers in the muscles."

The diagnosis rests upon the recognition of the parasite in the eye or in a tumor removed from the skin or muscle.

The treatment consists of their removal by surgical measures.

ECHINOCOCCUS DISEASE (HYDATID DISEASE).

The *tænia echinococcus* is a small tape-worm, from 4 to 5 millimetres long, in appearance like a white thread, with a small head which is provided with four suckers and a double row of hooklets, and composed of three or four joints, of which only the last is mature. It inhabits the intestine of the dog, fox, wolf and jackal; man becomes infected by ingestion of the eggs of the parasite into the stomach. The disease is common in countries where dogs abound and man is thrown into constant and close association with them; hence its frequency in Australia and Iceland. In America it is rare, Osler's collection of cases from all sources in America and Canada consisting of a series of eighty-five.

The egg having found entrance into the human stomach, its shell is digested and the embryo set free. The embryo is carried by the blood current into some organ, usually by the portal vein to the liver, and there it fastens itself by means of its six little hooklets, to develop into a hydatid cyst, filled with a clear fluid; this cyst is soon surrounded by a firm capsule of connective tissue. The cyst is composed of two layers: an outer cuticle of lamellated structure and an inner parenchymatous layer containing muscular fibres and blood vessels. In the course of four to six months the cyst attains the size of a walnut, and eventually that of a child's head. In the meantime buds develop from the inner layer, to grow into a second crop of cysts—"daughter cysts"—which in every way resemble the

parent cysts to which they are at first united, but from which they soon separate, floating in the liquid contents of the parent cyst; in the same manner another process of budding within the daughter cysts goes on, resulting in the formation of "granddaughter cysts." There are further generated from the parenchymatous layer of the parent and daughter cysts buds which develop into breeding capsules, from the lining membrane of which bodies gradually form which are known as scolices. The scolices are really heads of the parasites; they possess the four sucking disks and the circle of hooklets; each of these, transferred to the gut of a dog, fox or wolf, will become an adult *tænia echinococcus*. Thus each egg of this *tænia* is capable of developing into a cyst capable of producing an almost untold number of larvæ.

It has been pointed out that in man the formation of daughter- and granddaughter cysts proceeds from the inner membrane of the parent cyst, and this constitutes the endogenous form; in animals the buds frequently penetrate through the layers of the parent cyst and the secondary and tertiary cysts are formed externally, i. e. the exogenous form.

In still other instances the buds developing from the primary cyst are cut off entirely, encapsulated by connective tissue, joined together, and form in firm strands of connective tissue inclosing alveolar spaces about as large as a pea, in which are found the remnants of the cyst, sometimes containing scolices or hooklets. These constitute the multilocular echinococcus.

The liquid within the cyst is clear, limpid, yellow, of neutral reaction, non-albuminous, with a specific gravity of 1.005 to 1.015. It contains traces of sugar.

The growth of the cyst is slow, and its life may cover many years, according to some authors even twenty years. Death of the cyst, often from inflammation of or injury to the capsule, is followed by corrugation and shrinkage of the walls, with inspissation and calcification of the cyst-contents; or rupture may take place, possibly into a serous sac, or perforation through the skin, or into the bronchi, intestine, or urinary canal, even into the bile passages or inferior vena cava. The results of rupture vary; the hydatids may be discharged externally, followed by recovery; or the termination may be suddenly fatal. Suppuration and the formation of large abscesses is often seen in the liver.

Of 1862 cases, the parasites were found in the liver in 953, in the intestinal canal in 163, in the lung or pleura in 153, in the kidneys, bladder and genitals in 186, in the brain and spinal canal in 127, bone 61, heart and blood vessels 61, other organs 158 (Neisser).

Symptoms.—*Hydatids of the Liver.*—If the cyst be of moderate size, no symptoms may be experienced; in fact, a post-mortem examination may reveal the presence of a dead calcified echinococcus cyst the existence of which was entirely unsuspected during life. The cyst being large, there is likely to be a sense of pressure and of dragging in the region of the liver, sometimes considerable pain, usually of a dull character, and signs of tumor with enlargement of the liver. The latter will be indicated by bulging of the epigastrium or right hypochondrium, with increase of the area of hepatic dulness according to the size and location of the cyst. Should the cyst be very large and situated on the convex surface of the liver, it is almost sure to cause dyspnoea by crowding the diaphragm and compressing the lower lung. Compression of the portal vein or of large bile-duct is not uncommon, and results in ascites, splenic enlargement or jaundice. Pressure upon the hepatic vein or inferior vena cava causes œdema of the legs. Rupture of the cyst into the pleural cavity, lungs or intestinal canal may take place, resulting in inflammation; if into the lungs, pneumonia, often complicated with abscess or gangrene, may follow, with expectoration of echinococcus vesicles. Rupture into the bile ducts gives rise to jaundice and the appearance of vesicles in the intestinal canal. Rupture into the hepatic vein and inferior vena cava has caused sudden death from embolism of the heart and of the pulmonary artery. In case of purulent inflammation, with hepatic abscess, the symptoms will be those of pyæmia, with chills, night-sweats, jaundice, emaciation and probably death. After the use of the aspirator, urticaria is frequent, probably due to the absorption of toxic matter from the cyst-contents.

The multilocular cyst is almost limited to the liver. Such cases are always serious. The liver is enlarged and smooth, not uneven, to the touch. Jaundice, splenic enlargement, ascites, great emaciation and loss of strength develop. The termination usually is fatal.

Diagnosis.—If the cyst can be felt on the surface of the liver, the diagnosis is easy. The tumor usually is firm and flat or round; occasionally it is elastic. The so-called hydatid fremitus was at one time thought of great diagnostic value, but it has proved unreliable. It may be found in a superficial cyst by palpating lightly with the fingers of the left hand, at the same time percussing with those of the right. The sign consists of a vibrating tremulous impulse or movement which persists for a time. The aspirator may be used to determine the character of the contents of the tumor. The actual demonstration of the presence of the echinococcus vesicle is, however, the only positive sign.

The tumor of *sypilitic* disease of the liver is usually hard, not fluctuating. In *cancer* the constitutional symptoms are more severe and the cachexia pronounced, while in hydatids the general health remains excellent, even with great hepatic enlargement. In *dilatation* of the *gall bladder* the tumor is movable and its contents are mucoid. A *pleural effusion* on the right side may closely simulate an echinococcus cyst of the right lobe pushing up the pleura; in the cyst, the upper limit of the line of dulness presents a curved line the maximum of which is usually in the scapular region.

Echinococcus of the Lungs and Pleura.—No symptoms are experienced while the vesicles in the lungs are small. When they are large, there is compression of the lung tissue, leading to inflammation, possibly gangrene and cavity formation. Hæmoptysis is not infrequent; the expectoration contains the characteristic echinococcus vesicles. Perforation into the pleura is common, followed by sudden and severe pain, pleurisy, great dyspnoea and possibly empyema. Perforation of the pulmonary vessels leads to embolism and fatal hæmorrhage.

If the pleura is the seat of the affection, and the cyst is large, the symptoms are those of compression of the lungs, of hydrothorax, and of displacement of the heart and diaphragm. The physical signs are those of pleural effusion, with very irregular line of dulness. For a long time the general health may not suffer. The cysts may perforate the chest wall. Pleurisy is rare.

Echinococcus of the Kidneys.—While about ten per cent. of Neisser's cases showed involvement of the urinary apparatus,

of Osler's series of 85 cases only three showed affection of the kidneys. The left kidney appears to be the seat of the parasite oftener than the right. The symptoms are those of a slowly progressing atrophy of the organ, with low inflammation and adhesions, and a totality of symptoms very closely resembling hydronephrosis, the entire kidney becoming converted into one enormous cyst. General health remains undisturbed for a long time. Perforation oftenest takes place into the renal pelvis. The only positive means of diagnosis is puncture and examination of the fluid.

When the *nervous* system (brain) is the seat of the parasite, the symptoms usually are those of tumor, with stubborn headache, convulsions and gradually developing blindness. Thomas, of Australia, states that the cyst is oftener found in the cerebrum, and more frequently on the right than on the left side. In the *peritonæum*, when invaded by the echinococcus, very large tumors are frequently formed, especially on the subperitoneal tissues of the omentum and mesentery; they are also found on the pelvic walls, and vesicles may be free in the peritoneal cavity. No distressing symptoms are felt until the cyst is large enough to cause dyspnoea by crowding the diaphragm or until the stomach or intestines are compressed. Rupture may occur into the peritoneal cavity or, much more rarely, into the intestinal canal or vagina. The physical signs are those of the presence of fluid in the abdominal cavity. Puncture, performed with due care to guard against the escape of the contents of the cyst into a serous cavity, and examination of the fluid, affords the most reliable means of diagnosis.

Treatment.—The treatment is purely surgical. Until recently the aspirator was used for the withdrawal of the fluid and possible obliteration of the cyst. The extensive experience of Australian physicians has shown the futility of this method. They obtained much better results by boldly opening the cyst, thus securing complete evacuation. Suppuration sometimes follows. If occurring in the liver, the treatment is that of abscess. Surgical interference is not justifiable unless the cyst is large and causes serious trouble.

FLUKES.

The trematodes or flukes are dangerous to man chiefly when present in large numbers. The following are the more impor-

tant: *Distoma Hepaticum* or *liver flukes* occupy the bile passages and upper parts of the intestine, causing great enlargement of the liver, with ascites and jaundice; in other cases a chronic cholangitis may be set up, with thickening and calcification of the walls of the bile ducts.

Fluke-disease is endemic in Japan, and may exist for many years without serious results, but eventually diarrhœa, intestinal hæmorrhage and ascites take place, with, usually, fatal termination. The diagnosis rests upon the presence of the eggs of the parasite in the dejections. The liver-fluke is described as "a flattened fluke of elliptical outline, about thirty millimetres in length, its greatest width being twelve millimetres; it is provided with two suckers."

Distoma Hæmatobium or *blood fluke* (*Bilharzia hæmatobia*) is found chiefly in Egypt, also in Arabia and Southern Africa. It lives in the venous system, preferably in the portal vein and in the recto-vesical plexus of veins. It is presumed that the parasite enters the system through the drinking water (water of the Nile) used by the natives, of whom, in Egypt, nearly one-half of the lower classes are said to be infected. The symptoms are intermittent hæmaturia, with more or less pain during micturition. This condition may persist for years without causing much trouble, and a cure may even result from the death of the parasite, usually when there is no further infection, as in the case of removal from the infected region. In some cases, however, the bleeding is very persistent from intense hæmorrhagic inflammation of the urinary mucous membrane, anæmia becomes profound, and there is great loss of strength and flesh; occasionally fatal results obtain. The diagnosis rests upon the recognition of the eggs of the parasite in the slimy urinary sediment; they are easily recognized under the microscope with a low power, are ovoid in shape, translucent, so that the embryo is readily seen, and have a small spike at one end.

Distoma Pulmonale or *lung- or bronchial flukes* are found in the bronchi of natives of China, Japan, Corea and Formosa, and probably gain access to the system by the drinking-water. Their presence causes cough and occasionally hæmoptysis. The eggs may be found in the sputa.

ROUND WORMS.**ASCARIASIS.**

Ascaris lumbricoides, round worm, occurs more often in man than any other parasite. It is found in all countries and at any time of life, but more frequently in small children. It is a round worm, in shape not unlike the earth worm, pointed at both ends, yellowish or faintly reddish in color, striated transversely, provided with four longitudinal bands, and in the female reaches a length of from seven to twelve inches, the male being three or four inches shorter. The eggs are brownish red, elliptical, have a thick covering, and measure six one-hundredths of a millimetre in length; of these one female is said to produce about sixty millions. The eggs are found in the fæces and develop in moisture and warmth; the maturing of the worm requires no intermediate host. It is probable that infection is oftenest brought about by means of drinking water or contaminated food. The parasite lives in the small intestine, usually only one or two, but it may occur in larger, even enormous, numbers. If the latter, a palpable tumor may sometimes be felt and intestinal obstruction result from the parasitical mass. Usually no symptoms are caused by the presence of the parasite; but when a large number of the worms are present, there may be loss of appetite, nausea, distress in the bowels and irregular stool. In children of a nervous disposition, restlessness, fretfulness, grinding of the teeth, and uneasy and fitful sleep at night are familiar symptoms. The ascarides are in the habit of migrating to different parts, especially so when the patient is ill with some acute fever of which intestinal disturbances are a feature, or when he suffers from diarrhœa, dysentery or cholera. The worm may get into the stomach, from which it is expelled by vomiting; or it may crawl out of the anus and be found in bed; or it may get into the œsophagus and pharynx, and be thrown up or pulled out by the patient; or it may enter the larynx, causing great distress of breathing, even fatal asphyxia; or it may pass into the air tubes and give rise to fatal bronchitis; or it may get into the gall bladder or bile duct, causing hepatic abscess; or it may crawl into the Eustachian tube and appear at the external meatus. It may even perforate the intestine, causing peritonitis.

Treatment.—Of the vermifuges, whose use is practically unavoidable, santonine is by all means the most reliable. It should be given in capsule, gr. $\frac{1}{4}$ to $\frac{1}{2}$ to a child two years old, three to five grains to an adult, to be followed by a brisk purge. Oil of chenopodium, two drops three times daily, for a day or two, followed by a dose of castor oil, and the old-fashioned mixture of the fluid extract of spigelia and of senna, have also a well-deserved reputation.

Oxyuris Vermicularis, the pin-worm or thread-worm, is a common intestinal parasite, and occurs in both adults and children, but much oftener in children. The male is about four millimetres in length, while the female measures from ten to twelve millimetres. It occupies the large intestines, chiefly the colon and rectum. The female provides an immense number of eggs, which are passed with the stool; they are small and, when dry, are blown about, and are then taken into the stomach with the drinking-water or in eating lettuce and other vegetables which were indifferently cleaned; in the stomach the action of the gastric juice sets free the embryo, and its development is so rapid that a young worm is produced within a fortnight. The eggs are frequently deposited about the anus, and self-infection undoubtedly occurs often by transferring them to the finger-nails, in scratching, and from them to the mouth. The chief trouble arising from the presence of pin-worms is the local irritation and the intense itching produced by the movements of the parasite, especially at night. Restlessness, uneasiness and inability to sleep are great in the majority of cases, and nervous children become almost frantic in their determination to relieve themselves by scratching; in some cases the nervous irritability is intense and results in convulsions. The general health necessarily suffers; the child loses its appetite, grows thin, and becomes anæmic. In little girls migration of pin-worm into the vagina is frequent, and may give rise to masturbation.

The treatment consists of small doses of santonine, followed by a purge. When the child, at night, suffers excessively from itching, vaseline or belladonna ointment applied to the parts frequently affords much relief. It is, however, usually the better plan to fully awaken the child and administer a copious enema of cool water, made quite salty; the hips should be

raised, to have the water retained for some time. Injection of carbolized water, also cool, answers the same purpose, washing away the parasites and allaying the irritation of the parts. These injections should be repeated daily for a week or ten days, santonine being exhibited in the meantime. Under this treatment, renewed as circumstances demand, permanent relief is finally obtained. Injections of vinegar, aloes, quassia and turpentine are recommended; the latter should be used with some care. Certain remedies, although incapable of driving out the worm, are of value in controlling symptoms arising from their presence. Of these CINA is the most useful. It covers nearly the entire train of nervous symptoms which old nurses so readily recognize as due to "worms" and often affords surprisingly prompt relief.—STANNUM is very useful when the nervous tension is not so great, but when there is much abdominal distress, marked gastric derangement, restlessness, and the child lies on the abdomen, because the pressure thus obtained relieves the pain. Both CINA and STANNUM often bring about the expulsion of large numbers of the parasites.—CALCAREA CARBONICA, MERCURIUS SOLUBILIS, BARYTA CARBONICA, KALI MURIATICUM, NATRUM PHOSPHORICUM, SULPHUR and LYCOPodium will be found helpful when symptomatically indicated.

Ankylostoma Duodenale.—A white, thread-like worm; the female fifteen, the male about ten millimetres, in length. The eggs are oval, about 52 micromillimetres long by 32 micromillimetres broad, have a thin transparent shell and no operculum. The larvæ develop in moist earth and get into drinking water. When swallowed, the embryo escapes, and makes its home in the upper small intestine, chiefly the jejunum, causing the disease known as ankylostomiasis or dochmiasis. The parasite firmly fastens itself to the intestinal mucous membrane by its tooth-like hooklets. The harm done arises from the blood drawn by suction and from the irritation set up in the infected tissues. There is loss of appetite, nausea, vomiting, abdominal pain and intestinal catarrh, with serious disturbances of nutrition. The anæmia, however, depending somewhat on the number of parasites in the body, in importance overshadows all other symptoms. It may progress rapidly from the beginning, presenting the usual train of symptoms

which belong to that condition, or may assume the features belonging to the pernicious form, with fatal termination. Occasionally there is dilatation and hypertrophy of the heart. Recovery may take place in case the parasite dies and there is no reinfection, but even then the patient is liable to be left in a condition of invalidism which may persist indefinitely.

Bilharz, Griessinger and others have shown that the presence of this parasite is responsible for the severe forms of chlorosis found in Egypt, India and Brazil, possibly in the extreme southern part of the United States. The profound anæmia of laborers in tunnels, mines and brickyards is thought due to the same cause, the infection being conveyed in the drinking water.

Treatment.—Prophylaxis consists in the exercise of great care in providing good drinking water; it should be thoroughly boiled and properly stored. In some parts of Egypt, where the disease abounds, the inhabitants, it is said, are free earth-eaters, and thus swallow larvæ. The removal of the parasite is brought about by the oleoresin of male fern in full doses, followed by a brisk purge, or by the exhibition of thymol, five grains every two hours until twenty grains are taken, followed by a full dose of castor oil and turpentine. The diet should consist of milk and soup.

Filaria Medinensis or *Guinea worm* is an elastic worm about two feet long, which is found chiefly in Guinea, Egypt and India, and probably very rarely in this country; it is the cause of the disease known as *dracontiasis*.

The female worm only has been observed. It contains a very large number of embryos which escape into the water and develop in a small crustacean, man becoming infected by drinking the water. The female penetrates the intestine and finds a permanent habitat in the subcutaneous tissue, preferably in or about the feet, where it can usually be felt. Inflammation is eventually excited, followed by ulceration and suppuration; the whole parasite may be discharged when the abscess breaks. Though usually solitary, six, or more, are known to have been present in the same person.

Treatment consists in promoting suppuration and, in due time, winding the projecting end of the worm several times around a small bit of wood, then tightening it a trifle two or three times daily until the entire worm is withdrawn. Great

care must be had not to tear off a portion of the worm, lest the remainder will return to its habitat and not only keep up the inflammation, but still further infect the body by the migration of embryos.

Filaria Sanguinis Hominis.—Three species are here included: *Filaria Bancrofti*, *F. diurna*, *F. perstans*. Of these the former is the more important. The mature worm is hair-like and lives in the lymph-vessels, chiefly of the genito-urinary apparatus. The mosquito is thought to be its intermediate host. The embryo enters the blood through the lymphatics. It is encased in an almost invisible, elongated shell which does not appear to hinder its movements; it is about the one-ninetieth part of an inch in length and in thickness of the diameter of a red blood corpuscle. They are remarkably active and more easily seen under the microscope, especially at that time of the twenty-four hours when the patient sleeps. No symptoms are produced unless the worms or the ova block the lymph-channels; then hæmatochyluria, elephantiasis and lymph-scrotum result.

Hæmatochyluria consists of the passing, off and on, of milky-white or pinkish, bloody urine, which upon standing shows a slightly reddish clot and often a creamy layer on the top, due to the presence of fat-drops. The urine contains embryos of the filaria, which may also be seen in the blood of the patient, usually at night. The condition may exist for many years and not give the slightest trouble, but trifling vesical irritation and uneasiness in the lumbar region may be experienced. Blood-clots may collect in the bladder and cause inconvenience. In elephantiasis and lymph-scrotum there is inflammation of the wall of the lymphatics, obstruction to the flow of lymph, and dilatation and varicosis of the smaller lymph vessels. The fibrous tissues of the scrotum are enormously thickened. Embryos are frequently found in the chylous fluid which escapes from the dilated superficial lymphatics.

Hæmatochyluria, elephantiasis and lymph-scrotum may all be non-parasitic. No method of treatment has proved efficacious.

Other round worms which very occasionally infest man are: *Eustrongylus gigas*, which has rarely been found in the urinary tract of man; the *Strongylus longivaginat* (in the lungs of a child); *Trichocephalus dispar*, which lives in the cæcum, but so

far has not been shown to possess pathological importance; *Filaria Loa* (in subjunctival tissue; West Africa, South America); *Filaria lentis* (present in cataract); *Filaria bronchialis* (bronchial glands), and *Filaria labialis* (lip).

TRICHINOSIS—TRICHINIASIS.

This disease is caused by the embryo of the *Trichina spinalis*, which in the adult form lives in the small intestine. The female is three to four millimetres in length, the male from one to five, and is provided with two small projectiles from the hinder end. The larva is from six-tenth of one to one millimetre long, and lies coiled up in an ovoid capsule which is at first translucent, but becomes opaque and infiltrated with lime salts. When flesh containing trichinæ is eaten, by man or by animals capable of developing them, the capsules are digested and the trichinæ set free. They pass into the small intestine, there attaining their full growth, and usual maturity in about three days. The embryos, according to Virchow, are fully developed on the sixth or seventh day; they at once leave the intestine, and, passing through the peritonæum and connective tissues, reach the muscles, making their home in the primitive muscle-fibres, and there develop into the full-grown muscle form in about two weeks. An interstitial myositis is incidentally excited, and an ovoid capsule forms around the parasite, and may contain three or four of them. The capsule thickens, and in the course of a few months lime salts are deposited within it, the parasite itself undergoing no further changes and living for an indefinite time, even twenty or twenty-five years, although often they are completely calcified. This process of calcification is very pronounced in man, and renders the cyst visible; in swine calcification does not occur so constantly, and the cyst is not readily discovered.

The trichinæ thrive in many animals, but most abundantly in the hog. Swine may be fairly alive with them, and apparently not suffer in the least, but eat well and appear in excellent condition.

Man is infected by eating the flesh of the trichinous hog, unless the meat is thoroughly cooked, a process which destroys the parasites. Pickling and smoking the meat is not sufficient

to accomplish this purpose. Trichiniasis, therefore, is most frequent in countries whose people eat raw or imperfectly cooked pork, as is done constantly in North Germany. Epidemics of the disease, many persons having been infected from the same source, have occurred frequently, chiefly in North Germany, and occasionally in America, but on a less extensive scale in this country; Osler states that the Surgeon General's Library shows the records of 456 cases in America. Post-mortem statistics prove that trichinæ are found in $\frac{1}{2}$ to 2 per cent. of all the bodies examined.

Symptoms.—The intensity of the disease depends largely upon the extent of the infection; if only a small number of trichinæ are in the infected meat, the disturbance set up may be so slight as to pass unnoticed.

Symptoms of gastro-intestinal catarrh usually occur a few days after eating the infected meat, with pressure in the epigastrium, loss of appetite, vomiting, pain in the bowels, and diarrhœa which may be choleraic in its intensity. In some cases there is very early a great deal of muscular pain and stiffness, which is not due to the migration of the parasites, accompanied with much debility. The gastro-intestinal symptoms are not always observed, and in intensity differ much in different cases.

The symptoms of invasion occur during the second week, usually from the seventh to the tenth day, sometimes later, and their violence depends largely upon the number of parasites in the body; if the latter are few, the muscular symptoms are slight. The condition set up by the migrating worms is a myositis, with great muscular pain with tenderness on pressure, aggravation from motion, and swelling and tension, in character resembling rheumatism, and compelling the patient to find a position in which the least possible tension is exerted upon the muscles; he therefore lies with his limbs flexed and perfectly quiet. The patellar reflex is nearly always lost; there is also a decided loss of muscular excitability to the electric current, according to Eisenlohr, sometimes with delayed contractions and abnormally long duration of the contraction after the stimulus ceases. Symptoms differ according to the location and functional importance of the invaded muscles. If the masseters and pharyngeal and laryngeal muscles are involved,

there is great difficulty in chewing and swallowing; involvement of the motor muscles of the eye results in pain in the eye, which is often distressing; invasion of the diaphragm, intercostal and abdominal muscles causes dyspnoea which is aggravated by the difficulty of clearing the air-passages from accumulated secretions, and may prove fatal. Fever, rarely chills, is nearly always present in the more serious cases, the temperature reaching 102° to 104° , the fever itself partaking of an intermitting or remitting character. Œdema accompanies the invasion of the muscles and constitutes an important symptom. It shows itself first, at the end of the first week, in the face, eyelids, later in the extremities. Cutaneous eruptions, vesicles, wheals, petechiæ and pustules are common. Profuse sweating, followed by crops of miliaria and sudamina, is very frequent, and adds to the similarity which trichiniasis bears to rheumatism.

Emaciation usually progresses rapidly, and there is more or less anæmia. Consciousness in the majority of cases remains intact, but in the severest types delirium prevails, with dry tongue, rapid pulse and tremors, the totality of symptoms bearing a close resemblance to typhoid fever. In fact, as Struempell points out, the first case in which trichinosis was recognized at the autopsy, by Zenker, of Dresden, had been regarded before death as typhoid.

The urine usually is albuminous; in some epidemics pyuria is common. Bronchitis, pleurisy and pneumonia are complications which frequently occur in fatal cases.

Recovery takes place in two or three weeks, even sooner, in mild cases; in the severer form, in from six to eight weeks, but it is tedious, and it may take many months before the muscles again acquire their normal vigor. In children the disease runs a milder course than in adults. The mortality ranges from 2 to 33 per cent., and is greatest from the fourth to the sixth week. Death usually occurs from involvement of the respiratory apparatus.

Morbid Anatomy.—The changes in the muscles are characteristic. They are those of degeneration of the muscular fibres and, in the immediate neighborhood of the parasites, of acute interstitial myositis. The trichinæ may be recognized in the muscles by the naked eye as little whitish lines. Fatty degener-

ation of the liver is comparatively frequent. The intestinal tract presents evidence of acute catarrh, with hæmorrhagic effusions, and not infrequently, even in the fourth and fifth week of the illness, living trichinæ are found in the intestines. It is on this account that a smart diarrhœa in the early stage of the disease is more liable to result in good, rather than harm, to the patient.

Diagnosis.—The most important diagnostic symptoms are the muscular pain, swelling, œdema and dyspnœa, especially if preceded by a choleraic condition. When such symptoms occur in a number of people who have eaten pork, particularly about the same time, trichiniasis should be suspected and careful examination made of the meat eaten, of the stools of the sick, and of small bits of muscle taken from the patient under local anæsthesia. The trichinæ are readily recognized in the stool by spreading it thinly upon a glass-plate or upon a dark background, a low-power lens showing trichinæ as small glistening threads. *Typhoid fever* may closely resemble trichiniasis, but it has its peculiar temperature curve, enlargement of the spleen, and lacks the muscular pain and rigidity belonging to trichinosis. *Acute rheumatism* has similar pain and profuse sweating; but in trichinous disease swelling of the joints is not conspicuous, if at all present, and there is characteristic gastro-intestinal irritation. *Cholera* may be distinguished by its intense muscular cramps and rice-water discharges. *Acute antero-poliomyelitis* lacks the acute gastro-intestinal symptoms, is more steadily progressive, and runs a less rapid course.

Poisoning by Ptomaines has the same violent gastro-intestinal irritation and, often, profound depression of the nervous system, but the characteristic muscular disturbances, œdema and dyspnœa of trichiniasis are not present.

Treatment.—Under the head of *prophylaxis* must be placed, as of the greatest practical importance, all measures which tend to protect swine from trichinous infection. Here belongs due care in feeding the animals on clean, wholesome food, as grain, and not allowing them access to offal and filthy water. Systematic microscopic inspection of the flesh of all hogs killed is equally important. Unfortunately, nothing in this direction is done in the United States; if insisted upon, it would not only protect the people against infection, but would amply repay by

adding largely increased value to our export in pork. Furthermore, thorough cooking of all pork consumed effectively destroys the parasites. Infection having occurred and having been discovered within a day, or two, complete evacuation of the intestine must at once be insured by the liberal use of full doses of rhubarb, senna, turpentine or other laxatives. German physicians are in the habit of using glycerine, a tablespoonful every hour. Furthermore male fern, santonine, thymol, and other drugs of the same class should be freely exhibited. If these measures fail, and the symptoms indicate the invasion of the muscles by the parasite, practically nothing can be done save to relieve pain, give rest at night, and support the strength of the patient. Struempell advises the use of the prolonged hot bath.

Symptomatically indicated remedies will aid in sustaining the patient and be of service in guiding him to a favorable termination.

DISEASES DUE TO ARTHROPODES.

The *acarus scabiei*, *sarcoptes hominis*, or itch-insect. The female appears to the naked eye as a barely visible, yellowish-white, hemispherical little body; under the microscope it proves to be crab-like, with a conical proboscis and eight legs. It is forty-five one-hundredths of a millimetre long and twenty-five one-hundredths of a millimetre in breadth. The male is smaller and lives on the skin and in shallow excavations of the epidermis near the cuniculus which contains the female. It is said to die within six to eight days after impregnation of the female. The impregnated female alone bores a canal in the epidermis—the cuniculus—deposits from 20 to 50 eggs, and dies. The mite larva reaches its maturity in three to six days, breaks through the egg-shell, grows until it is 0.15 millimetres long and 0.10 wide, and crawls to the mouth of the burrow. According to some writers it escapes through “air-holes” in the burrow, runs about the integument for a time, and finally bores its way into the nest, where it passes through the moulting processes, moulting altogether three times. The parasites find their favorite locality upon the hands, especially where the skin is tender, i. e., between the fingers, and spread more or less rapidly

over the body. They are easily conveyed from one person to another, particularly so in those who are careless in their habits of cleanliness and in children. The migration of the parasites causes itching, especially at night, for which relief is sought by scratching, which results in excoriations and bleeding of the parts, with formation of crusts, particularly on sensitive parts, as the lower abdomen and the arm-pits, and often well-defined eruptions of a papular and ecthymatous character.

The diagnosis depends upon the recognition of the burrows or cuniculi; these, on exposed parts, are often destroyed by scratching; hence the wisdom of looking to parts less accessible. The location of the irritation occurs in the following order of frequency and is important: flexor surface of the carpus, sides of fingers and folds between them, palm of the hands, exterior aspect of the elbow, anterior axillary fold, nipple and its vicinity in females, umbilicus and its vicinity, penis, scrotum, buttocks, inner border of the foot, and those parts which are subject to repeated pressure and whose epidermis is thickened (Kaposi). The discovery of the mite is conclusive.

Treatment.—This consists of thoroughly washing the parts with a strong solution of soft soap, followed by careful washing with pure warm water, and generous inunction with sulphur ointment, which, in case of children, should be weakened.

Naphthol ointment (one drachm to the ounce) is also efficient.

While this treatment kills the itch-mite, and this is indispensable to a cure, it has no curative effect upon the skin-eruptions which so often result, especially in scrofulous persons, from the long-continued irritation kept up by scratching the infected parts. Here lies the value of internal medications and the usefulness of remedies like SULPHUR, SEPIA, PSORINUM, MERCURIUS, CAUSTICUM, ARSENICUM, LYCOPODIUM, NATRUM MURIATICUM and others, according to their peculiar characteristic indications.

Others, which only require mention, are: *Pentastoma denticulatum*, the larval form of *P. tænioides*, which reaches the nostrils, liver, spleen, kidneys, heart, and lungs, and there becomes encapsulated. In two months it perforates the cyst walls, and is set free. No serious results are attributed to it. *Pentastoma constrictum* is common in Egypt, but has rarely been found in America; it has been ejected from the mouth and with the

urine. The *Demodex folliculorum* lives in the sebaceous follicles, especially of the skin of the face, but has no pathogenic importance. The *Itodes ricinus* and *I. Americanus* are "ticks" which occasionally fasten themselves upon the skin, causing itching and slight local irritation. In their removal care must be exercised not to tear off the head; should this accident occur, the head must be picked out with the point of a knife or a needle. The *Leptus irritans* (harvest mite) also attaches itself in large numbers to the skin, causing itching and local papular or pustular inflammation.

PARASITIC INSECTS.

Pediculus or *Louse*.—Three varieties infest man: *P. capitis*, *P. vestimentorum*, *P. pubis*. Both the head and the pubic louse lay their eggs among the hairs, the former of the scalp, the latter of the symphysis pubis; in either case the eggs are firmly glued to the hair, appearing as minute whitish specks (nits). Great itching results, followed by scratching. In the case of infection of the head, there is a copious exudation of serous bloody fluid, which soon stiffens, matting the hair together, and sometimes forming a tangled and exceedingly filthy mat (*plica Polonica* of the Polish Jews). The pubic louse, the smallest of the three varieties, causes similar irritation and frightful itching, but one of the chief annoyances arising from infection with it lies in the frequent conveyance of the mite to other hairy parts, as the arm-pit, beard, eye-brows and eye-lashes. The *Pediculus vestimentorum* lives in the clothing, chiefly in articles worn next to the skin, but causes irritation by the bites which it inflicts, preferably between the shoulder blades, around the waist and upon the buttocks, leading to scratching, excoriations, formation of crusts, ulceration, etc. The tough, pigmented and scarred condition of the skin which results from the perpetual presence of these insects is known as "Vagabond's Disease."

Treatment.—The treatment is simple and efficacious. If the head is infected it is absolutely necessary to cut the hair short, else the nits cannot be destroyed. If the hair thus cut short is saturated with coal-oil, turpentine, or a lotion of carbolic acid (1:50), it will usually put an end to the trouble. Sulphur

ointment may be used, but sparingly. Mercurial ointment should be avoided here, lest it give rise to systemic mercurial poisoning. In case of the pubic louse, the parts had better be shaved or the hair cut as close as possible. Mercurial ointment should then be applied, and the parts thoroughly washed two or three times daily with soft soap and water. In the case of body-lice, the clothing must be thoroughly disinfected by being kept for several hours subjected to great heat, and if necessary and possible, it should be burned. A hot bath, to which from $\frac{1}{4}$ to $\frac{1}{2}$ pound of common washing-soda has been added, should then be given to the infected person, great care being taken in each case to prevent reinfection by observing rules of the strictest personal cleanliness and by avoiding association with suspected persons.

Wood recommends the following lotion as very soothing: one ounce of alcohol; one ounce of glycerine; two drachms of carbolic acid; fourteen ounces of water. Mix.

Cimex Lectularius (*Common Bed-bug*).—This parasite lives in the joints of wooden bedsteads and in the cracks of the walls and floors of buildings. It is of reddish brown color, about four millimetres long, and has a peculiar, offensive odor. Its habits are nocturnal; by means of a long proboscis it sucks the blood of man during his sleep. In some persons it thus causes a violent urticaria. The parasite may be destroyed by thorough fumigation with sulphur or by scouring with kerosene or a 10 per cent. solution of corrosive sublimate. Alkaline baths and a lotion of carbolic acid relieve the irritation of the skin.

Pulex Irritans, or *flea*, by its sting causes a minute hæmorrhage and, in some persons, a violent diffuse erythema or urticaria. The free use of insect powder will usually help keep away the flea; it is said on the Pacific coast that the oil of eucalyptus, freely used on the body and about the bed, often answers the same purpose. The results of a "flea-bite" upon those who are liable to suffer from it may be ameliorated by rubbing the stung part with dry salt, or bathing it with a strong solution of washing-soda, or anointing it with the oil of eucalyptus. In some instances all measures of relief fail.

Pulex Penetrans (sand-flea, jiggers) lives in the tropics. It penetrates the skin, preferably between the toes and under the toe-nail, causing inflammation, swelling, ulceration and occa-

sionally the loss of the toe. The use of strong aromatic oils on the feet is said to protect. It is removed by the point of a knife or a needle.

Myasis.—The term *Myasis* is used to express the result of the presence of maggots in different parts of the body of man, due to the invasion by flies of inflamed or eroded mucous membrane or of open wounds in any part of the body. Any of the flies (common house fly, horse-fly, bot-fly, etc.) may be attracted to these diseased structures and deposit their eggs upon them, from which the larvæ are developed in due time. This is especially common in the tropics. As a result of such invasion the existing lesion is much intensified; inflammation is greatly increased, destruction of tissue progresses rapidly, and severe constitutional symptoms may be provoked.

The treatment lies in the removal of the larvæ. If found in an open wound, they may be picked off; if in a sinus, they must be destroyed by injection. Absolute cleanliness and thorough antiseptics are all-important.

Internal myasis may result from swallowing the larvæ of the common house-fly or of species of the genus *Anthomya*.

Bot-flies are known to have penetrated the skin of man, and deposit their eggs, from which larvæ develop, causing boils and abscesses with, often, severe constitutional symptoms. Occasionally the eggs are swallowed and marked gastric and intestinal irritation produced by the larvæ. In the latter case relief is given by free purging with a mixture composed of one part of oil of turpentine and three parts of castor oil. Such cases are common in Central America, Africa and Russia, but are infrequent in the United States.

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